SPECIAL REPORT: Monster Fax Extravaganza

Incorporating PC Sources

October 1993

PC Computing

Hey! Wake up. It's the new standard.

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Eye-Popping!!

Multimedia PCs

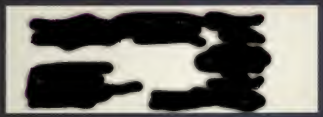
Also...

Zoomer vs. Newton

Coolest Scanners We've Seen!

Your Laptop: Airborne Terrorist?

Database Blowout: 4-Way Face-Off



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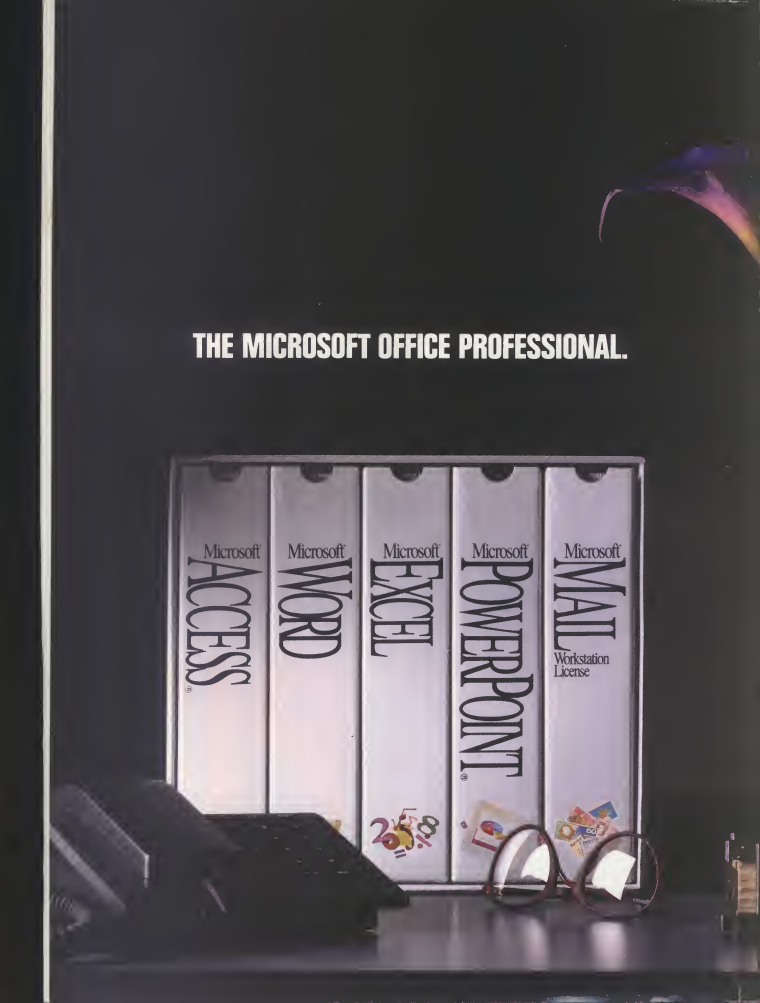
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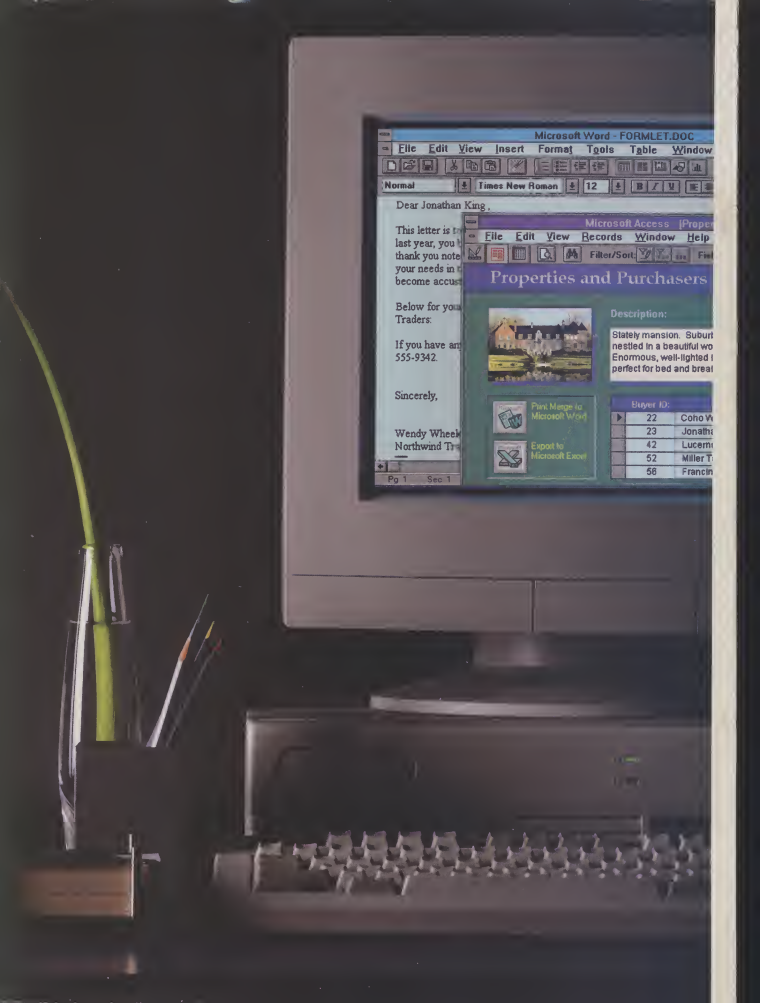
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PC MAGAZINE EDITORS' CHOICE

MARCH 1993
MX 15F

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- MPR II
- PINCUSHION CONTROL
- TILT CONTROL
- 16 PRESET & 8 USER MODES
- NEW PRICE!

PC MAGAZINE EDITORS' CHOICE

JULY 1992
MX 17F

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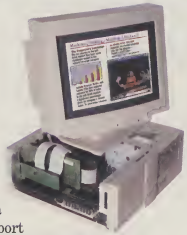
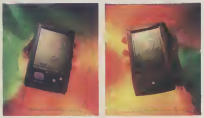
PC Computing



Cover Story

138 Multimedia Explosion

Get this: Most major systems manufacturers tell us the bulk of their machines are shipping with CD-ROM drives and other multimedia extras built in. Multimedia is fast becoming the new PC standard. This month's report spotlights five superhot **multimedia PCs,** six ultraslick **CD-ROM drives,** six to-die-for **sound cards,** six killer **speaker sets,** a library of **CD-ROM titles** (including favorites from John C. Dvorak and Ron White), six sensational **upgrade kits,** and everything else you need to know to buy your next PC.



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PAGE 230 FASTER FAXES—ON A BUDGET

194 PDAs Are Here: Zoomer vs. Newton

MARTY JEROME

PC power in your pocket! Tandy and Apple have hit the ground running with the first two up-to-snuff personal digital assistants ever. Even though second-generation PDAs will be cheaper and more capable, these gizmos are already poised to banish the current crop of schlocky handheld computers to the graveyard shift on the Home Shopping Network.

210 Terror at 66MHz

COREY SANDLER

Aren't you ashamed? According to airline safety bureaucrats, you and your portable PC are more dangerous than a bomb-toting fundamentalist kook. Is there anything to this wild-eyed pilot dread, or is it a load of pseudoscientific voodoo? One thing's for sure: None of us wants to bring down a 747, especially when we're on it.

230 Fast and Easy Faxes

PRESTON GRALLA

Time is money. You don't need a Wharton MBA to figure out that slashing your average fax time in half cuts a huge chunk out of your annual phone bill. How do you do it? Simple. Get hold of a high-speed fax modem and the right fax software. We put the best of the best to the test.

270 Super Databases

PETER COFFEE

If you can point a mouse and pull down a menu, you can create powerful database applications. We put four powerhouses—Borland's Paradox, Lotus's Approach, Microsoft's Access, and Software Publishing's Superbase—through rigorous usability and performance tests. The results will surprise you.

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36 Dirt-Cheap Color Notebooks
New portables from TI and AST spell the end of the monochrome era.

38 Color Printing Under $500
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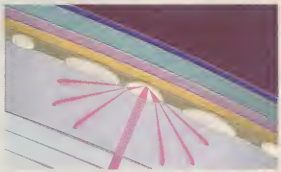

PAGE 324 HOW WRITE-ONCE CD DRIVES WORK

COVER PHOTOGRAPH BY FRED STINSON

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270 .....**Super Databases** ____ 786
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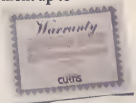

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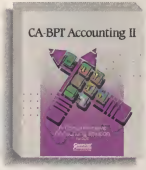

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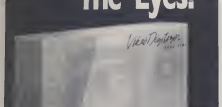

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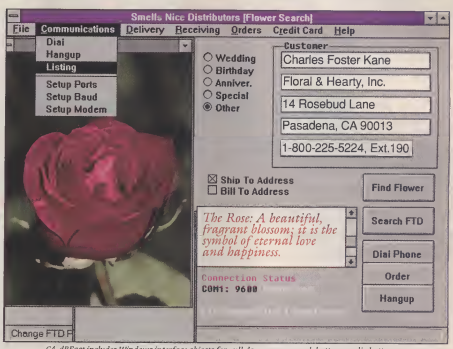

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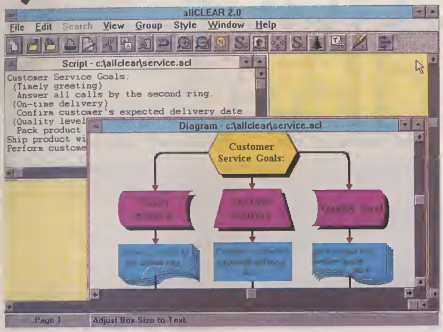

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IF I TELL YOU THAT MY DOG'S TAIL IS REALLY A LEG, THEN how many legs does faithful Fido have? If you said five, guess again. Just because I say a tail's a leg, that doesn't make it so. And when Microsoft refers to its first release of Windows NT as Version 3.1, we all ought to know better. This is Version 1.0 of a big, complicated operating system. And like any first effort, it can stand a few improvements.

Now that the NT team is back from vacation, I suggest they head over to Starbucks, load up on some of that 32-bit, superscalar espresso, and look for inspiration in a most unlikely place: IBM's OS/2 Version 2.1. Because while the NT team was feverishly swatting NT bugs in Redmond, IBM was quietly turning the Workplace Shell into a work of art. If I were in charge of NT, here's what I'd steal first:

PHOTOGRAPH BY RICHARD MORGENSTEIN

Multimedia Presentation Manager Would you try to win the Indy 500 in a golf cart? Windows NT includes the same underpowered Media Player and Sound Recorder applets as Windows 3.1. Check out their full-strength counterparts in OS/2's Multimedia Presentation Manager. You get 30-frames-per-second video and a robust set of tools that developers are raving about. Multimedia is what 32-bit operating systems were made for, so do it right.

A Real Object Strategy I get dangerously close to a full theta state when I talk about objects, so let's just leave it at this: IBM has the System Object Model (SOM). Microsoft has Cairo. SOM is already partly implemented in OS/2. Cairo may or may not exist behind swirling clouds of vapor. What are the chances that Cairo will become a published, open development environment like SOM? I'd guess 7 billion to 1.

Aliases Wouldn't it be great if you could keep pointers to your program and data objects everywhere you needed them without having to copy the original files? You can, if you use OS/2 or the Mac's System 7.0, thanks to aliases. NT's file system is fast and powerful—and missing this key feature.

Usable File Associations If God had intended us to use the FAT file system, He would have given us eight fingers and three thumbs. Fortunately, NT and OS/2 both allow long filenames. But guess which one still forces you to associate data files with apps using the old, three-letter extension?

Individually Configurable DOS/Windows Sessions You've got a gazillion Windows 3.1 apps, plus a few DOS standbys you keep for sentimental reasons. OS/2 runs the DOS applications better, thanks to its amazing capability to individually configure virtual DOS machines. But OS/2 also runs the Windows apps better—or at least safer. The biggest selling point of a 32-bit operating system is security, right? NT requires you to stuff all your Windows 3.1 apps in a single virtual machine; if one goes down, they all go down. OS/2 lets you load each one in its own protected space.

Folders Within Folders OS/2's got 'em. The Mac's got 'em. For cryin' out loud, even the Amiga's got 'em. At your local computer superstore, there's an entire aisle devoted to Program Manager replacements, and every one of them lets you nest folders inside other folders. How much code would it have taken to fix this ridiculous flaw in Program Manager—2K? OS/2 did it right, by letting you add icons, folders, or any object you can think of right on the desktop. It tossed the whole notion of a Program Manager right in the trash. Speaking of which . . .

No More File Manager I know at least two editors who've patched the code in WINFILE.EXE so that the title bar reads "File Mangler" whenever they fire up that dreadful Windows applet. Why can't files, directories, and even entire drives simply have icons that sit on the desktop alongside programs? That's the OS/2 way, and it's amazingly easy to get used to. You can even drag files into the shredder/trash can/black hole, a GUI gotta-have-it that Windows still doesn't have.

The Microsoft Squeeze Play How long does it take to install NT? Half an hour? Half a day? Or half a work week? MS-DOS 6.0 says I have 100MB of free disk space. Yet when I try to install NT, I can't get past the opening screen. The problem is DoubleSpace data compression, which is 100 percent incompatible with NT. The budget-busting solution is to back up, buy a new hard drive, restore all data, and then install NT.

With OS/2, I can still use compressed drives within individual DOS sessions, and although there's no built-in compression, there's a great third-party solution, Stacker for OS/2. Microsoft has a moral obligation to develop DoubleSpace for NT.

Here's what you get when you cross Windows NT and OS/2 2.1.

A Batch Language OS/2 has the REXX batch language. OK, so maybe we don't all want to learn REXX. But even a quirky batch language is better than none at all, which is what you get with NT. One of these days, Microsoft will get around to shipping the systemwide BASIC macro language it's been promising for the past five years. I hope that happens soon.

Online Help Microsoft's is good. IBM's is amazing. In OS/2 2.1, every word of every manual is online and searchable. Every piece of software should offer this much help.

Go ahead—take a stand. Tell me why I should stop picking on Microsoft. Send your comments to: NT vs. OS/2, *PC/Computing,* 950 Tower Lane, 19th Floor, Foster City, CA 94404. ◪

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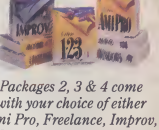

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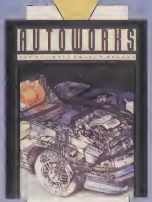

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Much Ado About Windows NT

Media pandering, Penn's paranoia, and your pet usability gripes.

NT = Not There

Your Windows NT "Special Issue" ("Windows NT," July, page 118) is much ado about vaporware. Novell 4.0 is not here yet, and NT, as I write, is still under development.

Please give us honest reports about shrink-wrapped products that we all can buy. We'll wait.

SAMUEL PENNINGTON
WALDOBORO, MAINE

Let's see if I have this right: NT isn't out yet (but that's OK because we're talking about Microsoft). It needs 16MB of RAM and 70MB of disk space. It runs Windows 3.1 programs slowly, doesn't run a few big name apps at all, and 32-bit versions of many apps won't be available until next year (or the year after). Although OS/2 2.1 is here now, has had a year to have its bugs worked out, and runs available 32-bit apps, it's not made by Microsoft so it's no good.

Come on, guys. Call a pig a pig.

DAVE BETENIA
VIA COMPUSERVE

It's ironic that *PC/Computing* did a big splash on Windows NT—which is still in development—when IBM had just released a major upgrade to OS/2, an operating system that has everything you tout in NT: It's crash-proof, it doesn't require DOS, and it has a familiar interface, built-in networking, and 32-bit multitasking capabilities. I might not have noticed this irony if it were not for the fact that I received your magazine, with *NT* in big letters on the cover, the very week that I ordered OS/2 2.1 on CD-ROM and installed it on my system.

TOM DARAIS
SALT LAKE CITY, UTAH

Windows NT, Windows 4.0, Cairo, Chicago, tomorrow, next week, maybe later, blah, blah, blah . . . .

I'm running OS/2 2.1 on a LAN today, right now. OS/2, DOS, and Windows software all happily cooperate to enhance my productivity and reduce my stress level. (Boys and girls, can you spell *General Protection Fault?)*

If it weren't for John C. Dvorak's column, "The Windows NT Sleight of Hand: Microsoft's Artful Promotion," (July,

page 98), I might think you guys receive paychecks with a Windows watermark. It's ironic that the very thing Dvorak decries in his column is demonstrated in an NT feature in the same issue.

MARK HAMPTON
ALLEN PARK, MICHIGAN

If you are in search of a great graphical user interface, it's sitting right under your nose. It's called the Macintosh. It comes with a mouse and an operating system, and it has a SCSI interface and sound capabilities built in. I realize that the letters *PC* are in your magazine's name, but IBM clones aren't the only personal computers.

WILLIAM R. HALL
GLOUCESTER, VIRGINIA

Dvorak Gets It

Bravo, Dvorak. I was beginning to think I was the only one who noticed that Emperor Gates wore no clothes—and produced no software that delivered what it promised.

KEVIN B. FRENCH
FAYETTEVILLE, NORTH CAROLINA

Three cheers for Dvorak's column on the hysteria surrounding Windows NT. He displays a rare and necessary perspective on a product that is still more marketing than substance. Unfortunately, he's overshadowed by the 5-inch-tall *NT* on your cover.

MICHAEL MCDONNELL
NEW YORK, NEW YORK

Obviously, Dvorak was right. *PC/Computing* is part of the Microsoft conspiracy to have the customer wait "just a little longer" for a stable version of Windows NT to come out.

LINDEN DECARMO
PLANTATION, FLORIDA

Why not have Dvorak write an NT review? Read his column and then read the NT article. Everything that he said was wrong with NT reviews appears in your review. Were your editors asleep at the wheel when these manuscripts passed over their desks?

JASON WESTWATER
VIA COMPUSERVE

Hacks, Geeks, and Wonks

Computer people can be divided into two groups: wild-eyed hacks armed with humor and an irreverent view of society, and stiff, stressed-out geeks with less humor than IBM senior management. While the former aren't particularly concerned with the habits and opinions of the latter, the latter see it as their responsibility to impose limitations on the former.

It's not surprising that Jillette's column is controversial. Neither is it surprising that Dvorak and Somerson's infantile, boring, and fake debates come under little hostile fire. They stick to the script and don't subject the geeks to anything but computer-related issues.

JON WIEST
TORONTO, CANADA

Hey, wonko-techno nerds, geeks, and all other pretenders to the throne of the PC: Lighten up! Your segregated little club has been broken up by popular demand. All across this great land of ours—in offices, schools, homes, cars, and even in airplanes—the minions are clicking, pointing, and pounding away on their PCs.

Penn-bashing letters are so unbecoming. His column never fails to make me laugh. It's not meant to be a techno-treatise. It's meant to make you smile.

PC/Computing's strength lies in its refusal to take itself as seriously as some of its readers take themselves. To those readers, I say move over—you're holding up the rest of us who are anxious to learn as much as we can, as fast as we can, and have a little fun along the way.

SHARON M. ALFORD
GAINESVILLE, FLORIDA

Not Ready for Prime Time

Dvorak and Somerson wasted a lot of breath in their pseudodebate "The Video Revolution Is Here—But Will We All Be Using Windows-TV?" (July, page 114). Why bother discussing it? The most intelligent thing anyone can do with a television is to shut it off, pull the plug, and push it out the door.

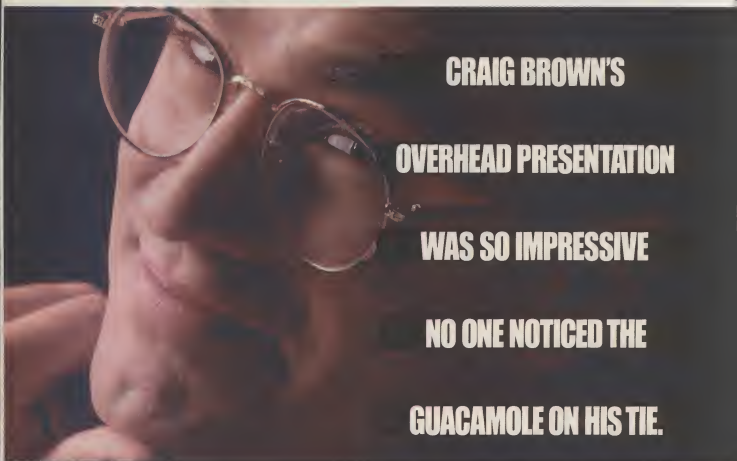
DANIEL R. LECLAIR
HOUSTON, TEXAS

Where did you get these guys? The July columns by Dvorak (page 98) and Schwartz ("You Know I Can't Hear You When My Modem Is Running," page 100) were intolerable. What a waste of trees! Drop their columns. Nobody will notice, honest. Wiser readers (which I am now) aren't reading them anyway.

JOE LEHMAN
KENOSHA, WISCONSIN

Penn's Profanity and Paranoia

In this day and age, the public is blasted with language that would have been unacceptable ten years ago. We hear it in movies, on television, in novels, and, obviously, on the street. But I wonder why a magazine that is as professional as *PC/Computing* is allows obscene language in its pages. In the



first paragraph of Jillette's July column, ("Business Class, First Class, or Faraday Cage?" page 336) the Lord's name is used in vain. The article could easily have been written without this language and would have been just as interesting.

DON RIDLEY
MIDLAND, GEORGIA

Jillette finally crossed the line. The profanity in his July column was offensive to me, and I'm not usually sensitive to this kind of language. A few of us are still concerned about the gradual erosion of our moral values. Penn's choice of words only indicates that he has absolutely no other way to forcefully express himself.

TOM ALEXANDER
SHADY SHORES, TEXAS

Let's face it. Anyone who spends as much time, money, and effort as we do sitting in front of a monitor (that we'll probably learn someday causes some bizarre form of brain cancer) and clacking away on a keyboard (which we already know contributes to carpal tunnel syndrome) must be a computer nerd. But we don't need to lose our sense of humor. In fact, I feel that working on a computer as much as we do requires a sense of humor—otherwise we'd have blown up our PCs long ago, or banished them to the basement next to the abacus and old, black, rotary-dial phones.

I love Jillette. He's a breath of fresh air. I hope airport security doesn't take away his laptop.

BETH A. DAVIS
MILLERSBURG, PENNSYLVANIA

If Jillette's column was supposed to be funny, it missed the mark. If it was supposed to be serious, Jillette needs professional help for paranoia.

My safety and security when flying are worth a little inconvenience. On a recent flight, computer use was prohibited during takeoff and landing. Is that so bad? Making airplane navigation systems less susceptible to interference is a good idea.

KENNETH BRADY
WAYNESBORO, GEORGIA

Like you and Jillette and many of our readers, we also frequently travel with laptops. Concerned about inflight restrictions and safety, we tested a variety of electronic devices—including laptops—at an avionics lab. See our report on page 210 for our findings.
—Christine Grech

Pet Peeves

I was pleased to read Bott's column, "*PC/Computing*'s Bill of Rights for the Usability Revolution," (July, page 20). I agree that the ultimate benchmark of any computer product is how many hours it saves you each week, but he misses an important point: Usefulness

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is much more important than usability. A program can be very easy to use but essentially do nothing toward saving us time.

DARCY MASON
VIA COMPUSERVE

A Misleading Message

We take great exception to the tests you used to benchmark 5¼-inch magneto-optical drives in "The Four Best Ways to Get a Gigabyte" (July, page 158). The test you used, PC Bench, weights its results in favor of small-file transactions—a profile that is hardly typical of Alphatronix optical drive users. Had you reported the results for files 4MB and larger, the Alphatronix Inspire II would have outperformed the Pinnacle Micro drive by a full 32 percent. You have deprived your readers of the full story by reporting only a single score weighted in favor of small files.

BRIAN RITCHIE
VICE PRESIDENT, MARKETING, ALPHATRONIX

PC Bench was developed by ZD Labs to produce a single score, or harmonic, for each component tested. The disk harmonic represents what ZD Labs research determined to be representative of how most people use their hard disks. PC Bench produces several scores that make up the disk harmonic based on transferring files ranging in size from 256K to 32MB.

The results show the Alphatronix drive winning by large margins on files of 32MB, 16MB, and 8MB. Around the 4MB mark, the products are very close, and from 2MB down to 256K the Pinnacle drive outperformed the Alphatronix by a large margin.

If you're using an optical drive to run applications, the Pinnacle drive is the better choice. However, if you primarily use an optical drive to store larger files such as graphics, sound, or a database (8MB or larger), the Alphatronix is the clear winner.

—Adam Meyerson

Getting Serious, Going Mobile

Your article "In Search of the Ultimate Notebook" (July, page 184) states "If you want to do serious work on a PC, it needs to run Windows."

Come on, *PC/Computing*. There must be hundreds of thousands of us DOS users who have been doing serious work on PCs for years.

LEWIS P. CONNOLLY
BELMONT, CALIFORNIA

Almost all the notebook and laptop reviews I read fail to mention an important feature: autoresume. This brilliant feature lets you turn off the computer without leaving Windows or closing applications and documents. You start up again with the push of a button—without having to reboot DOS, run Windows, load the applications, and open your document. This feature is a great boon, and I know a number of laptop diehards who wouldn't consider a machine that doesn't offer it.

Spine

The s-shaped curve of your spine needs support when you sit at your computer or else the strain of poo

© 1993 Ergodyne

Laptops are for people on the go, so booting up and powering down should happen instantaneously.

ROBERT COWART
BERKELEY, CALIFORNIA

You pay insufficient attention to the suspend/resume feature in articles on portable computers. Nearly all notebooks claim this feature, but it's almost useless on most. As more people use portables all day, they will find that it's crucial to keep organized—to always know which apps are running, where they're located in the document they're working on, and so on. But the suspend feature on most notebooks uses too much power: The battery runs down halfway through the day, even if you use the machine for 20 minutes!

You would do everyone a service by publishing how long batteries last in suspend mode in your reviews of notebook computers.

RICK CATTELL
LOS ALTOS, CALIFORNIA

Ron White's "Ultimate Notebook" story contains a glaring omission: a discussion about batteries. Specifically, do all the notebooks *PC/Computing* reviewed use the same type? Are they of a standard design and widely available, or are they proprietary?

MARK SCARBECZ
FLORENCE, SOUTH CAROLINA

First questions first: All the machines we tested feature a suspend/resume mode. However, gauging a machine's battery life during suspend mode in a meaningful way isn't easy. Our battery rundown tests at least provide a level playing field for comparison. As for battery designs: All the notebooks we reviewed use proprietary batteries, except for the HP OmniBook 300, which uses four AA batteries. Because all of the proprietary designs are rechargeable, however, you don't need to worry about finding replacements in a store.

—Marty Jerome

We're Here to Help

I would like to see a collection of tips for power Windows users who have system configurations that are better than what you find in average systems.

Most of the tips I read are designed to help users get the most out of minimum configurations.

I purchased 16MB of RAM to get the most of my applications, but the tips I read are geared toward lesser systems.

GREG SADDLER
VIA PC/CONTACT

Great suggestion, Greg. You'll see the technical level of our Help section rising in the coming months, which means there will be more material for people who have muscular configurations like those you describe. —Dylan Tweney

Happy Endings

I have read numerous letters in many magazines from people having a hard

sure could hurt your back, so work smart with our comfortable, adjustable back rest.

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ergodyne WorkSmart

software for your hardware 1-800-323-0052

Circle 160 on reader service card.

time with Gateway 2000 ("Gripes About Gateway," Letters, July, page 29). I recently purchased a 4DX2-66E from Gateway and have had no major problem with the machine or the company's phone services. Gateway 2000 has done a very decent job of keeping up with its growth.

I hate reading about people who can't have something their way and just want to complain.

SCOTT O'DAY
OAK LAWN, ILLINOIS

Truth Be Told

It's time for software developers to adhere to a truth in packaging policy. The outside of the package should state the minimum and optimum PC configurations for running the product.

Case in point: Microsoft's Access. The minimum configuration, according to Microsoft's documentation, is a 386 with at least 2MB of RAM. Obviously, this setup would just barely run the software.

With a truth-in-packaging policy, the box would state that the minimum configuration is a 386 with 2MB of RAM, but the optimum configuration would be a 486 with 8MB of RAM.

Software developers will resist this suggestion because it would cut into potential sales. But I suspect that this would be preferable to negative publicity when countless frustrated PC users start complaining, as I am.

EARL SMALLSHAW
MIDDLETOWN, CONNECTICUT

We couldn't agree more that computer users need informed, real-world advice about the optimal specs their PCs should match to run their applications productively. Part of the problem for software developers is deciding just what optimum is. That's a judgment call, because it's based in part on users' performance expectations. So PC/Computing *recently created a new department of the magazine—called Spec Watch—that makes these judgment calls for you. Check it out on page 347. Spec Watch covers a variety of product categories every month, and its recommended specs will be updated whenever market expectations or technologies change.* —Scot Finnie

Correction

In the June "Hardware Buyer's Superguide" Network Servers category (page 168) we ran the wrong toll-free number for the Hertz 486/D66X2Ee entry. The correct number is (800) 232-8737.

Mail your thoughts to Letters, PC/Computing, *950 Tower Lane, 19th Floor, Foster City, CA 94404; fax us at (415) 578-7029; or contact us via MCI Mail at PCC Editorial or via PC/Contact, our online forum. Letters must be signed and must include a daytime phone number. All letters become the property of* PC/Computing *and will be edited for length and clarity.*

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Pocket size ▪ HP plug-in cards
Netware ▪ TCP/IP

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- Serial port can be input to printer or output from network at up to 115.2K baud
- Prints status and configuration at the push of a switch
- Comes with a one-year warranty and unlimited technical support, made in USA

NETWARE FEATURES

- Supports 8 queues on up to 8 file servers
- Automatically locates queues on file servers
- Can notify user of job completion and printer errors
- Supports encrypted passwords
- Shows status via Netware's PSC and PCONSOLE
- Installation program simplifies setup
- Auto detects and uses 802.3 and Ethernet II
- Auto detects and reattaches to new file servers
- Simultaneous queue server and PSERVER

yes
It runs with NetWare

TCP/IP FEATURES

- Finds IP address from BOOTP, RARP, or memory
- Supports LPR, RSh, Rexec, and standard TCP/IP connections to any TCP/IP host
- Configure using Telnet, TFTP, or the serial port
- Supports secure hosts with list of allowable IP addresses and subnet masks
- Notifies user of job completion via SMTP mail
- Notifies supervisor of paper out, off-line, and jobs printed by sending SYSLOG entries
- Shows estimated job completion time and throughput via LPQ command
- Customized banners in PCL or Postscript
- User-defined strings before and after job
- Flash EPROM for easy upgrade to new versions
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Tips & Tricks

for some of your favorite applications

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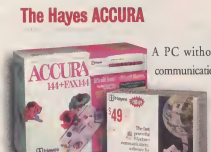
The Hayes ACCURA



A PC without a communications link is like one hand clapping; if you are unable to connect to the world of on-line databases, networks and Fax machines you might as well work in a closet. With this vast on-line world, however, many people aren't sure where to start. And once they start they end up making several purchases before finding the right combination.

Hayes, which has long set the standards for modems, now supplies a one-stop, economical answer to all of your PC communications needs. The Hayes ACCURA 144+Fax144 modem provides, in a single box, all of the hardware, software and cabling needed to go on-line. Communications protocols and speeds change quickly, with something faster and better always just around the corner. ACCURA customers, however, need not worry about such details. This modem handles up to 14,400 bps using CCITT V.32bis, which set the standards for high-speed communication. It can also operate as slowly as 300 bps, which means that it can connect to practically any modem on the planet.

Hayes Accura 144 +FAX144 Modem

Full Communications Solution
INTERNAL
List Price: $369
DUSTIN PRICE: $225
EXTERNAL
List Price: $399
DUSTIN PRICE: $249

Requires: (Accura) Open serial port. (Smartcom) Windows 3.0 or higher; DOS 3.1 or higher; 2 MB RAM; 5 MB hard disk space; Modem.

Communication has become one of the most important software categories. Without an effective communication structure your PC is like one hand clapping. Dustin Discount Software makes it easy for customers to communicate their order on a toll-free line or use the convenient 24-hour FAX line (818-884-5310) to place your order 'round the clock.

Hayes Smartcom for Windows

While a "light" version of Smartcom for Windows is included with the Accura modem, many will want the full package. Smartcom for Windows has three founding principles: simplicity, automation and performance. This makes Smartcom a great choice for anyone who wants to tie a PC to the outside world. While experienced communicators will be surprised at how little is needed to perform advanced functions, novice users will be able to make their first connection just by entering a phone number and clicking an icon. Smartcom is both fast and efficient and, in addition to supporting all popular terminal emulations and file transfer protocols, Smartcom also includes the ESI driver for the Hayes ESP communications accelerator. This allows you to incorporate the most sophisticated high-speed and data loss prevention abilities on the market today. So when you make a connection with Smartcom, you will only need to make it once.

Hayes Smartcom for Windows

Full Communications Solution
SMARTCOM
List Price: $69
DUSTIN PRICE: $49

TIP While your ACCURA modem is capable of traveling at the fastest speeds, you may need to slow down to accommodate the folks on the other end. Poor line quality may force you to decrease the speed accordingly. Nevertheless, the ACCURA will allow you the maximum speed for existing conditions. It is equipped with the latest error correction technology, automatically adapting to the signal.

TIP SMARTCOM for Windows supports five major languages: English, German, French, Italian and Spanish. You can change the default language at any time. In order to facilitate international communication, you can purchase a Smartcom for Windows package and ship it to an overseas colleague.

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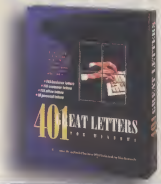
TIPS, TRICKS & SHORTCUTS

401 Great Letters for Windows: Help When Words Fail You



401 Great Letters for Windows

Letters for all Occasions

List Price $49
DUSTIN PRICE: $39

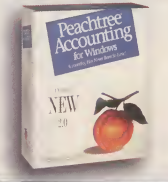
Requires: Windows 3.0 or higher; DOS 3.1 or higher; 1 MB of system memory; 1.1 MB of hard disk space.

Computers are meant to save time by streamlining repetitive tasks. Since most all businesses rely on correspondence of some sort the word processor has become the most universally valued office tool. Still, many people find that they type the same information into the computer over and over.

401 Great Letters for Windows provides pre-written missives on a variety of subjects, from strictly business to purely personal, that are accessible with a few mouse clicks. At that point, you just enter specific items—for which the program provides prompts—and the letter is ready for printing and posting. Consequently, a task that could take an hour is completed in minutes.

It's possible to execute simple edits from within the program, or transfer some or all of the text to any word processing file. You can change any or part of a letter to reflect personal style and preference, or send it off as is. As a result you make more time for any activity—like writing letters.

Peachtree Accounting for Windows: Tastefulness for Accounting



Peachtree Accounting for Windows

Accounting Made Easy

List Price $169
DUSTIN PRICE: $125

Requires: Windows 3.1; DOS 3.1 or greater; 2 MB RAM; 7 MB hard disk space.

As anyone in business knows, a company with a weak accounting system is a weak company. Peachtree, the first name in small business accounting software, now offers an easy-to-use package designed for businesses new to accounting. Peachtree Accounting for Windows has the capacity to grow with the business, and can accommodate the needs of users who have several years of accounting experience.

With release 2.0, Peachtree Accounting for Windows includes dozens of powerful, easy-to-use features. They include an intuitive icon bar, features screens that resemble the forms they represent (checks, invoices, etc), a facility to add notes to transactions, the ability to customize all aspects of the program, and a thorough tutorial and help facility. Since accounting mistakes can be crucial, it protects your data with built-in features that guard against a variety of potential errors, automatically checking for unbalanced entries, and reconciling an unlimited amount of different accounts.

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FAX 1-818-884-5310

TIP Writing a generic business letter is a necessary daily chore which 401 Great Letters for Windows helps to streamline, but the program takes the process a step further. Each of the letters in this program is professionally written to suit general occasions (you add the specifics yourself). They not only read well, but look great—providing ample space for the signature in the appropriate place. The "personal" category includes subjects from complaining to your neighbor about noise to breaking up with a girlfriend or boyfriend. These letters help reduce the clutter of daily life, and allow you to spend your valuable time on something more worthwhile.

TIP Smart Guides allow you to become more familiar with both the accounting process and the Peachtree Accounting for Windows program by explaining what information is required and the purpose of the different areas in which you are working. The context-sensitive Smart Guides help you over the learning curve, but don't stand in your way once you are up and running. When you feel comfortable with the program, just turn them off. Fo many users, accounting has represented a necessary but bitter pill to swallow. This is a program with power and personality that simplifies daily financial tasks and will make you look forward to balancing the books.

Use Dustin's 24-hour fax line 818-884-5310 to place your order today. Same day shipping on in-stock items-coupled with free ground shipping guarantee the solution to your software needs quickly and with no added charges.

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TIPS, TRICKS & SHORTCUTS

Encarta and Dinosaurs: The Latest and the Greatest

Encarta and Dinosaurs

Learning Adventures

DINOSAURS
List Price: $79
DUSTIN PRICE: $59

ENCARTA
List Price: $399
DUSTIN PRICE: $259

Requires: Windows 3.1, 386SX/20 or higher, CD ROM Drive, and Audio Board, Head phones or speakers

Over the past few years, CD-ROM software has evolved from an amusing curiosity into the reference tool of the future. Today, when your PC is equipped with a CD-ROM drive and a sound card, you can access a world of information with a few mouse clicks.

Microsoft Encarta, a multimedia encyclopedia, provides several decided advantages over its printed counterpart. In the first place, it doesn't take several bookshelves to store its multitude of information.

For a different slice of history, Microsoft Dinosaurs offers an interactive journey into the world of dinosaurs—what they looked like, how they sounded, what their environment was like, how they lived and how they died. This unparalleled learning experience is the most comprehensive examination of this subject now available, and assembles expert knowledge from every known source.

Microsoft Word 6.0

Microsoft Word 6.0

Grammar & Writing

List Price: $395
DUSTIN PRICE: $329

Requires: DOS 3.0 or higher, 384 K available memory, 1.5 MB hard disk space (5.5 MB for full installation).

The third featured package from Microsoft proves that software doesn't need to be native to Windows in order to be up to the moment. Microsoft Word version 6.0 for MS-DOS incorporates many Windows advantages, such as TrueType fonts and drag-and-drop editing. Its graphic look and menu structure echo the popular Word for Windows. For the first time, users with less powerful machines can buy into the exciting world of graphical word processing with no compromise needed.

As users move toward the Windows and Macintosh operating systems, there has been a dramatic shift away from character-based word processors. Microsoft Word version 6.0 provides a capable upgrade for current users of DOS Word who still want or need a character-based word processor but still want to take advantage of increasingly popular and convenient graphical word-processing features.

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TIPS ❶ Encarta includes a game called "Mindmaze." Players work their way through the different rooms in a castle by answering multiple-choice questions based on Encarta's contents. For a deeper look at a subject, players can stop and take a side tour, or they can continue until all questions are answered and earn a "prize."

❷ You can sponsor a Dinosaur-based invasion of your system. The CD-ROM includes two screen savers: dinosaur feet walking across the screen or a random projection of the most interesting dinosaur heads. Both are supplemented by sound effects. You can also turn any image from a slide show into wallpaper, so these lovable beasts will never be far away.

Dustin Discount Software provides not only the best programs but economic values such as free ground shipping, corporate accounts and no surcharge on credit cards. Further efficiency results from same-day shipping, orders-by-fax and a service-oriented, knowledgeable sales staff. Use Dustin's 24-hour fax 818-884-5310 to place your order today.

TIPS ❶ Microsoft Word version 6.0 for DOS doesn't operate in a vacuum. Improved file conversion tools automatically import files from several popular formats. It also includes a transition Help module, explaining the differences between versions 5.0 and 6.0, along with a detailed guide to help WordPerfect users move into the Microsoft Word environment.

❷ If you buy Microsoft Word version 6.0 for DOS now and register the software, you will receive a free copy of Microsoft Word 6.0 for Windows when it is released later this year. This dual license gives you a path to the present and the future of graphical word processing, across all platforms.

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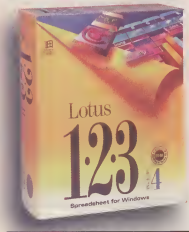
Lotus 1-2-3, release 4: New Power From the Dean of Spreadsheets



Lotus 1-2-3 version 4

Powerful, Versatile Spreadsheet

Price $495

DUSTIN PRICE: $325

COMPETITIVE UPGRADE

DUSTIN PRICE: $109

Requires: 4 MB RAM; 16 MB hard disk space.

The first Lotus 1-2-3 spreadsheet was the first great PC application, and provided the motivation for many people to buy their computers in the first place. With the advent of more powerful hardware and graphical computing, the wonder of the spreadsheet has taken a back seat. Today it has returned: Lotus 1-2-3 version 4 redefines how spreadsheets are used by both incorporating all current innovations and looking to the future.

In developing this program, Lotus listened to and incorporated more than 4,000 user suggestions. This adds up to a product with ease of use built in from the ground up. The interface is consistent with other Lotus applications, including SmartIcons, a live status bar and explicit menus. So as you learn Lotus 1-2-3 version 4, you gain the power to master other programs in the Lotus family—AmiPro, Freelance, Lotus Organizer, ceMail and the new Approach database—cutting learning time and decreasing training costs. And all these applications are designed to work with and optimize the power of Lotus 1-2-3 version 4. Features like One-Step Charting—where you can pick up all titles, data, legends and axis labels directly from the worksheet to produce an instant chart—save an endless amount of time and frustration.

Lotus 1-2-3 version 4 is the first spreadsheet developed especially for workgroups. Today's corporate user exchanges files as a matter of course, and confusion can result about who did what, and when. The Version Manager eliminates the confusion, labeling each file with tracking information without overwriting the data. So you always have your hands on the latest version.

With Worksheet Tabs (making it easy to switch from one sheet to another) and streamlined data base functions, Lotus 1-2-3 version 4 has shown that a good spreadsheet doesn't need to be dull or hard to use. All the functions are right there, where you need them—allowing you to concentrate on the product of your labor rather than the process. Ease of use and a straightforward initiation into the spreadsheet working process lead the many ways that Lotus 1-2-3 version 4 redefines productivity. With context-sensitive menus, a live status bar and worksheet tabs (which allow easy access to different spreadsheets at one time) you can get exactly what you want, and when it is needed.

Lotus 1-2-3 clearly beats all the competition in four key areas: ease of use and process, innovative workgroup capabilities, its role as a key member of an application suite, and as the best transition from DOS to Windows.

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TIP ❶ **Throughout Lotus 1-2-3 version 4, the program includes context-sensitive Quick Menus that are activated with the right mouse button. You click on an object, and a floating menu with all of the commands relevant to the current selection appears. This saves a trip to the menu bar.**

❷ **Drag and drop operations are a convenient part of Lotus 1-2-3 release 4's operations. So there can be no doubt, the cursor changes into a hand when such an operation is possible. And drag and drop allows the efficient moving and copying of data.**

❸ **Lotus 1-2-3 version 4 has a convenient "what you see before you get it" (WYSBYGI) feature. Here, you can preview fonts, colors and formatting attributes before applying them, to decide if a reformat is a good choice or sends the right message,**

❹ **You can color code different versions of the same spreadsheet. For example, you could apply color so the worst case and best case scenarios are respectively red and blue. As a rule, Lotus 1-2-3 version 4 allows the fast, convenient application of formatting, allowing you to highlight the most important data.**

❺ **Since a spreadsheet is more than just numbers, Lotus 1-2-3 version 4 includes a powerful spell checker. And if you have installed more than one Lotus application, they will share that function to save disk space.**

At Dustin Discount Software there are thousands of products in stock, with the lowest prices on the very latest versions of every package. In addition, Dustin offers its customers the means to stay current—any software package purchased from Dustin authorizes you for competitive and version upgrades for when the need and/or opportunity occurs.

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TIPS, TRICKS & SHORTCUTS

CorelDRAW 4: Building the Perfect Picture

CorelDRAW 4

Complete Graphics Solution

COREL UPGRADE
List Price: $349
DUSTIN PRICE: $239

COREL DRAW 4.0
List Price: $595
DUSTIN PRICE: $395

Requires: Windows 3.1; 4 MB RAM; 28 MB hard disk space (full installation); VGA or higher; Mouse or tablet; CD ROM drive (to use all clip art and help).

Users seeking to harness the full range of Windows' graphical power need to look no further than the new CorelDRAW 4. While some solutions require separate purchases for drawing, charting, animation, optical character recognition and presentations, the new CorelDRAW 4 offers a complete one-stop graphics option in an integrated, modestly-priced package. All these features add up to a substantial value, making CorelDRAW 4 the most capable and complete graphics solution in the market today.

TIP **CorelDRAW 4 is fully object ready, allowing you to tie different aspects of illustrations to other programs and modules. For instance, you could design a machine and call up information about each component with a mouse click. Or you could design a fancy gown, determining how different options would change the total cost.**

MKS RCS: Coordinating Software Projects

RCS

Revision Control Software
List Price: $395
DUSTIN PRICE: $229

Requires: Windows 3.1, DOS 3.1 or higher, VGA, 4 MB RAM; 2 MB hard disk space.

Many software developers who automate most of their corporate functions still spend a lot of time locating files, organizing files and verifying they are using the correct file revision to build a software release. With MKS RCS, you are given the tools to manage your software resources and improve how you create and release a software product. Not only will you improve file control, you will immediately benefit from an improved work environment. You will see this increased productivity translate into bottom-line savings.

TIP **MKS RCS includes substantial disk space savings. Different revisions are stored in an archive file—a single file that houses the original and any changes made to the program by you or any of your colleagues. You don't store the whole of each revision, only the differences between them. And with large, executable files, this saving can be significant. You gain the freedom to concentrate your efforts on development.**

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allClear for Windows:

allClear for Windows

Flowchart Tool
List Price: $299
DUSTIN PRICE: $195

Requires: Windows 3.1; DOS 3.0 or higher; 2 MB RAM; 2 MB Hard disk space; Mouse.

Flowcharts and diagrams are an essential part of business communication. Many executives, however, don't have the time, energy or artistic instincts to produce these charts themselves. With this in mind, allClear for Windows automatically creates exciting and explicit visuals from a text file, without requiring any drawing, dragging, dropping or designing. It saves time and money, and eliminates retraining required to produce compelling diagrams and minimizes the possibility of embarrassing mistakes or unattractive visual elements. Ultimately, allClear for Windows helps you to more effectively transmit important messages. And the ability to show these messages with clear, easy-to-understand visuals will improve communication both within your company and to the outside world.

TIP **allCLEAR for Windows lets you view the text file and the document on the same screen. This provides a dynamic link; as you update the text, the changes are immediately reflected on the diagram. If you want to update the information on an existing chart, you only need to change the text. A new document is then created automatically, with no redrawing required.**

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New!

ANNOUNCING: THE WARNING BELL FOR MONOCHROME NOTEBOOKS

TI and AST Roll Out

WHERE'S THE JUICE?
It takes more power to drive a color screen than it does to drive a monochrome display, so in addition to a few hundred dollars, expect to give up a little battery life to get color on your notebook.

That's true with the AST Bravo NB 4/25s, but not the Texas Instruments TravelMate 4000E WinSX/25, which runs on impressive 2 hours and 49 minutes without using any of its considerable power-management techniques. That beats not only the color notebooks we've tested but the full-size monochrome notebooks as well.

The Bravo got a middling hour and 30 minutes of full-power operation on a single charge.

Under full power-management conditions, the TI 4000E WinSX/25 got 5 hours and 43 minutes in our battery rundown tests—that'll take you across the country.

Hey, you can't have everything. Or can you?

SOONER OR LATER, you're headed for a color notebook. Sure, monochrome notebooks are still cheaper, but not much. The only questions: When will you take the plunge? And how much are you willing to pay?

How about shelling out a couple hundred extra for a 486SX/25-based machine from one of the best names in the business? Texas Instruments is all but declaring war on its brand name peers by offering the new TravelMate 4000E WinSX/25 for about $2,150 on the street—only about $200 higher than the street prices of many similarly configured brand name monochrome notebooks. The color may be passive matrix, but there's nothing low-end about this machine, including the screen quality. It's light, and it screamed through our Windows application tests.

The TI notebook will land on dealer shelves at about the same time as the Bravo NB 4/25s—another good-looking, color notebook from another popular name, AST. At $2,499, the Bravo NB 4/25s sells for the same price as the TI, but its LCD is larger than the 4000E WinSX/25's—9.5 rather than 8.2 inches—and it offers a PCMCIA slot and faster battery recharging. And the Bravo still slides in under the price tags of the market-leading Compaq Contura 4/25c and Toshiba Satellite T1900C by $50 or so.

Passive-color notebooks have moved way out of the $5,000 neighborhood that they lived in when they debuted two years ago, because the cost of everything inside notebooks—not just displays—has fallen dramatically and is still tumbling. As the 4000E WinSX/25 and Bravo NB 4/25s begin to appear on dealer shelves, your main problem may be finding one—notebooks are a fast-selling commodity.

AST's Bravo NB 4/25s notebook fell short of the TI 4000E WinSX/25 in speed as well as battery-life tests, but its display is larger.

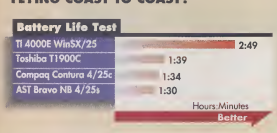
In Living Color

Neither machine requires you to settle for less in the way of features. You get a standard 4MB of RAM that is expandable to 20MB, and 120MB hard drives. The AST machine's single Type 3 PCMCIA slot accepts a small hard drive and has a convenient switch that slides it open. The TI entry lacks a PCMCIA slot but has a 120-pin connector for the $929 TravelMate expansion station with three full-size 16-bit card slots and three drive bays.

At 8.6 by 11.7 by 1.7 inches, the Bravo NB 4/25s is a just fraction of an inch smaller than the Compaq and Toshiba models. (A monochrome version of the Bravo NB 4/25s is only 5.5 pounds and a mere 1.5 inches high). The 4000E WinSX/25 is smaller still at 8.5 by 11 inches, but it's a rather tall 2.1 inches.

The AST Bravo 4/25s and 4000E WinSX/25 are not only smaller but lighter than average—6 pounds with battery, compared

PC/COMPUTING LAB REPORT:
FLYING COAST TO COAST?



Dirt-Cheap Color

to 6.7 and 6.9 pounds for the Contura 4/25c and the Satellite T1900C respectively. Both have diminutive AC adapters for the nickel–metal hydride batteries that keep your traveling weight at 7 pounds or less. The 4000E WinSX/25 adapter has the intelligence to recharge in three to four hours whether the notebook is being used or not. The Bravo NB 4/25s recharges in only two hours.

The color of these new notebooks is much sharper and richer than the first passive-color generation thanks to local-bus graphics, improved drivers, and other performance-tweaking techniques. Instead of the 16 colors of earlier notebooks, both the 4000E WinSX/25 and Bravo NB 4/25s deliver a bright 256 colors at 640-by-480-pixel resolution (as well as 16 colors at 1,024 by 768 on an external monitor). Both the WinSX/25's Cirrus Logic graphics adapter and the Bravo NB 4/25's Chips and Technologies adapter sit on a local bus. The Bravo NB 4/25s has 512K of dynamic RAM video memory; the 4000E WinSX/25 has 512K of faster video RAM.

The 4000E WinSX/25's 8.2-inch Sanyo LCD is a tad smaller than all three competitors—certainly smaller than the Bravo NB 4/25s 9.5-inch screen—but it's hardly noticeable. Both machines are easy enough on the eyes.

Hold on to your hat. TI's 4000E WinSX/25 whipped through our speed tests—and it kept chugging along in our battery-life tests.

Top Gun

The Bravo NB 4/25's Windows performance lags behind that of the Contura 4/25c and the Satellite T1900C, but the 4000E WinSX/25 outgunned them with the best Windows app performance of any notebook we've ever tested in this class. The results were about the same with battery life.

The 4000E WinSX/25's keyboard is the same unique 4-millimeter-travel, soft-landing design found on TI's WinDX/50—its feel is simply unsurpassed by any notebook keyboard. You can barely hear its full-size keys when they land. AST's keyboard offers a respectable 3mm travel but suffers when compared to the TI model's.

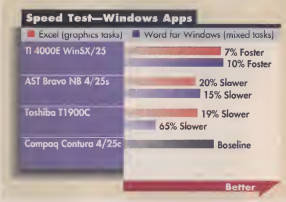
When it comes to speed and battery life, the TI TravelMate 4000E WinSX/25 is the hands-down winner. But note that the Bravo NB 4/25s, the Satellite T1900C, and the Contura 4/25c are so close behind that we're measuring differences in ounces, fractions of an inch, and a precious few dollars.

In any case, it's clear that color-notebook prices are headed south. Ask yourself if it isn't pennywise and pound foolish to invest in a monochrome notebook and forgo the pleasure of full-color Windows. **MIKE HOGAN**

BRAVO NB 4/25S • $2,499 • AST RESEARCH • (800) 876-4278, (714) 727-4141
Circle No. 602 on Reader Service Card

TRAVELMATE 4000E WINSX/25 • $2,499 • TEXAS INSTRUMENTS INFORMATION TECHNOLOGY GROUP • (800) 847-2787
Circle No. 603 on Reader Service Card

PC/COMPUTING LAB REPORT:
TI BLAZES THROUGH TESTS



TURBO SPEED
TI's 4000E WinSX/25 has the same highly integrated, homegrown TI motherboard as that found in the top-of-the-line, active-matrix WinDX2/50.

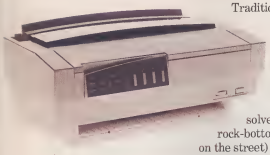
The WinSX/25 ran 7 percent faster than our baseline Compaq Contura 4/25c in the graphics-heavy Excel test suite and 10 percent faster performing a variety of Word for Windows tasks. Suffice it to say, it was much faster than AST's Bravo NB 4/25s, which trailed both the Toshiba T1900C and the Contura in the Excel tests but edged out the Toshiba in the Word tests.

HOW LONG UNTIL YOU PRINT IN COLOR, TOO?

Flash! Color Printing

PRINTING IN COLOR is like owning a Mercedes. Sure, it'll impress your clients, but it's expensive up front and it will cost you a bundle in parts.

Traditional thermal wax-transfer color printers not only cost about three times more than monochrome laser printers but are also more expensive to use because of the high cost of supplies. Star Micronics' new SJ-144 solves part of the problem with a rock-bottom $599 list price (under $500 on the street) and the ability to print on plain laser paper.



IT'S CHEAP BUT SLOW
As you'd expect in a color printer that can be had on the street for less than $500, the Star Micronics SJ-144 includes compromises. The biggest one you'll make is speed, as the chart below shows. Look at the difference in performance between Tektronix's Phaser 200i and the Star when printing a color presentation. HP's DeskJet 1200C, at a list price less than $1,700, also trounced the Star printer in every test.

The SJ-144 is a crossbreed of color technologies, kind of like a tyrannosaurus rex meeting a garter snake. It combines the dye-coated ribbon of a thermal wax-transfer printer and the ribbon cartridge of a dot matrix printer. Using a heat-fusion printing process, the dye is melted onto the paper, where it reforms as a solid dot. The ribbon cartridge is not only easy to install and use but the dye won't smear on the page like color ink does, so you get a printer with better print quality than the market-leading HP DeskJet 550C that costs nearly $300 less.

While Star's heat-fusion technology results in crisper text, it requires a smooth print surface, meaning a finer grade of paper. The dye doesn't adhere as well to recycled or ordinary copier paper. We used Hammermill's Laser Print 10460 substance 24.

The SJ-144's print quality was excellent for spot color. Our test documents included a four-page Lotus Freelance presentation, several pieces of color clip art, and a six-page Word for Windows business report with spot color. While the HP and Tektronix printers were more than twice as fast as Star's entry, we rated the SJ-144's print quality best for printing documents combining text and color graphics on plain laser paper. The DeskJet 1200C's colors were faded and there was some ink smearing, especially in the text. The Phaser 200i, on the other hand, produced bright, vibrant colors, but because the plain-paper ribbon creates a composite black (combining cyan, magenta, and yellow to make black), text was blurry and hard to read.

However, the SJ-144 didn't print our presentation well at all, leaving serious banding in the background. The problem is inherent to the SJ-144's narrow color ribbon, which prints a band of color about ⅜-inch high across the page, alternating yellow, cyan, magenta, and black. A full page of color printed on the Star is made up of a visible series of color bands. Traditional thermal transfer printers, like the Phaser 200i, print each color over the entire page, avoiding any banding. Color ink jet printers, like the DeskJet 1200C, also print in bands, but a more precise paper-handling mechanism and a heater that blends the bands result in smoother backgrounds.

Thermal transfer and color ink jet have a definite edge for full-page color graphics, but you'll pay through the nose for either technology. The Phaser 200i costs $5,995 (a slightly slower version, the Phaser 200e, sells for $3,695) and the DeskJet 1200C costs $1,699. What do you get for the money? Along with the ability to print color presentations with full-page graduated fills, you get a dramatic performance

PC/COMPUTING LAB REPORT:
MORE SPEED, MORE BUCKS

Note: All documents were printed on Hammermill LaserPrint paper.

The Tektronix Phaser 200i has fabulous print quality and the best network options, but it's not the cheapest color printer around.

Under $500

HP's DeskJet 1200C is a dream machine, but be sure you keep your documents bone-dry to avoid getting a tie-dye effect.

improvement. Printing our business report took 14 minutes on the SJ-144, but only 4 minutes on the DeskJet 1200C and 5 minutes on the Phaser 200i. Both the HP and Tektronix printers have their own internal processors, while the Star relies on the computer for its processing. We tested the SJ-144 on a 486DX/33MHz system with 4MB of RAM, our recommended configuration for working with color files.

In addition to being slow, the SJ-144 has a hidden operation cost that makes it unsuitable for high-volume color printing, costing you three times as much as the Phaser 200i to print the same document. Each page you print on the SJ-144 will cost $1.88—regardless of how much color or text is on the page—because of the high cost of its color ribbon. The Phaser 200i has a low 59-cent cost per page, and the DeskJet 1200C's per-page cost varies with the amount of ink placed on the page but tops out at 49 cents for 100 percent coverage.

Its high page cost and slow print speed make the SJ-144 best suited for one or two copies of short documents (five pages or fewer) that consist primarily of text with occasional color. Ideally, you'd print only the color pages on the SJ-144 and output the rest to a LaserJet 4 or comparable printer using the same paper.

The DeskJet 1200C is a better choice for printing longer (five- to ten-page) documents with color spread throughout, although you have to keep your documents bone dry. Coffee spills, rainstorms, or even a sneeze can literally run your text right off the page. But the DeskJet 1200C is fast and has a low cost per copy.

For intensive presentations work—paper or transparency—go with the Phaser 200i. Its print quality can't be beat for full-page color. At $5,995, it's expensive, but it has network options to make the printer accessible to an entire department. It also has the print speed and paper capacity to keep up with everyone.

If you're printing color documents twice a month or less, or you want to explore how color can improve business communications, the SJ-144 is a great choice. It's slow and has a high cost per copy, but at a street price of less than $500, it's a hard printer to pass up.

CYNDY BATES

STAR MICRONICS SJ-144 • $599 • STAR MICRONICS AMERICA • (212) 986-6770
Circle No. 604 on Reader Service Card

HP DESKJET 1200C • $1,699 • HEWLETT-PACKARD • (800) 752-0900
Circle No. 605 on Reader Service Card

TEKTRONIX PHASER 200i • $5,995 • TEKTRONIX • (800) 835-6100, (503) 627-7111
Circle No. 606 on Reader Service Card

WATCH PRINT COSTS

The up-front cost of the Star Micronics SJ-144 is unbelievably low, but make sure you take its higher per-page printing costs into account.

The high cost of the SJ-144's ribbon means you'll pay about $1.88 per page. The Tektronix Phaser 200i and HP DeskJet 1200C printers are much, much cheaper over time if you have intensive color printing needs. However, if you're looking for only a splash of color here and there, the Star entry still comes in at an eye-popping price.

For many users, color documents aren't isolated occasions. If you intend to put a little spot color in your quarterly reports—and not much else—the SJ-144 has *bargain* written all over it.

WHAT'S THE CATCH? SUPPLY COSTS

	HP DeskJet 1200C	Star Micronics SJ-144	Tektronix Phaser 200i
Cost of materials			
Presentation*	$15.20	$75.20	$23.60
Business report*	$4.20	$112.80	$35.40
Color technology	Liquid ink jet	Heat fusion	Thermal wax-transfer
Footprint	323 square inches	70 square inches	193 square inches
Weight	29 lbs.	5.5 lbs.	40 lbs.
Supported media	Copier paper, laser paper, glossy paper, transparencies, envelopes, labels	Laser paper, transparencies, envelopes, postcards, labels	Laser paper, coated paper, transparencies

*Cost of paper coloront for 10 copies of a 4-page presentation (70% coverage) and 10 copies of a 6-page report (1.5% coverage).

Exclusive! Compaq Hits a Homer With Its All-in-One Presario

GREEN COMM MACHINE
The Presario is the first PC to have a 9,600bps/2,400bps fax/data modem built right onto the motherboard and is designed to be left on 24 hours a day so that you can send and receive faxes or e-mail, or log onto bulletin boards after hours.

Extensive voice-mail capability can give each family member password-protected voice mailboxes with incoming and outgoing messages that are recorded or played back over a telephone handset—even on the road.

Because the Presario is meant to be left on 24 hours a day, it has to be green. It runs at only 80 watts during normal operation. The hard drive and monitor can be powered down to 25 watts after ten minutes of nonuse, and the machine will go into a deep-sleep mode after another ten minutes and draw only 21 watts.

WHAT'S A PC? For more than a decade, it's been a box with a monitor, keyboard, and mouse. In the office, we call them desktops. On the road, we call them laptops. Compaq has decided to take its show to your home and figures that if a PC is ever to become an appliance like your phone, TV, or Frigidaire, it will need a third design.

The new Presario is called a tabletop because ideally the machine is supposed to sit unobtrusively on a table, counter, or shelf in a dining room, den, or home office—or be moved among all of them—so that family members can cruise up anytime and check voice mail, send e-mail, get a quick checkbook balance, write a term paper, or just play a game.

The Presario combines a small-footprint CPU with a 14-inch color monitor in a space-saving design reminiscent of the Apple Macintosh. The 13-by-11-inch footprint and fewer cables—a single power cord, plus mouse and keyboard cords—make for easy movement and quick setup.

Friendliness Counts

The Presario boots up on a clear welcome menu from which you can branch to tutorials, diagnostic tools, system setup, or the Windows desktop with its ready-to-go graphical applications.

A simple mouse click will take you into the Quicken for Windows personal finance manager or PFS:WindowWorks 2.0 with its integrated word processor, spreadsheet, database manager, charting package, and data communications modules.

Because the Presario ships with a fax modem, you also get MaxFax for Windows fax software and starter kits with limited free time on both Prodigy and America OnLine. And as far as performance is concerned, the Presario was only a hair slower than Compaq's Contura 4/25c notebook in Excel and Word for Windows speed tests.

The Presario's 0.28mm dot pitch monitor looks just a little sharper than normal because its Cirrus Logic graphics adapter is bolstered by a half-megabyte of video RAM and set to display 256 colors at 800-by-600-pixel resolution right out of the box. It also displays 16 colors at 1,024-by-768 resolution.

An Unconquered Market

Fax modems, software bundles, and ease of use are not new ideas. They have put PCs in only about a quarter of America's 97 million households, even though manufacturers have been trying to bust into this huge piggy bank for a decade. It's been a nickel here and a dime there because, says Compaq, home PCs generally have been underpowered, underfeatured, and undersupported in order to achieve a low price point.

Combining CPU and monitor components on one motherboard helps lower costs, improve serviceability, and keep the Presario's price down. A 25MHz 486SX-based machine with 4MB of RAM (upgradable to 20MB) and a 200MB hard drive should land on retailer shelves for about $1,399. That's with two ISA slots and a socket to add a 50MHz or 66MHz 486DX2 in the future.

You also get Compaq's exceptional RemotePAQ diagnostic software that lets technicians perform a variety of repairs, files, patches, and upgrades via phone 24 hours a day. For more serious problems, there's a three-year warranty, the first year of which includes onsite service.

For the first time ever, home office/recreation/personal productivity buyers will have a full-powered machine, solid support, and a brand name that inspires confidence. The Presario could bring it all home.

MIKE HOGAN

COMPAQ PRESARIO • $1,399 • COMPAQ COMPUTER CORP. • (713) 370-0670
Circle No. 607 on Reader Service Card

At just 11.5 x 9.5 x 2" and 5.5 lbs., the PanelBook is the smallest LCD panel ever, yet still has all the features.

Introducing the PanelBook™ 550 from In Focus Systems.® An LCD panel should fill the room. Not your briefcase. That's why we developed the new PanelBook. It's the smallest and most convenient LCD projection panel ever. Up to 40% smaller than most panels.

The next-generation active-matrix LCD panel. Keep the features. Lose the weight. With the new PanelBook, you don't give up anything. It's fully featured with integrated data and video.

Inside, you'll find a drawer that expands the panel to full size. It also makes a handy place to store the wireless remote.

Another innovation from the leader in LCD technology. In Focus Systems offers a complete family of LCD projection solutions for all your needs. From low-cost black & white and color, to high-resolution workstations and fully integrated projection systems. We also offer the LiteShow II™, our exclusive presentation-management system.

ANNOUNCING A VERY SMALL BREAKTHROUGH IN LCD PROJECTION TECHNOLOGY.

So it projects from simple presentations to full-blown multimedia. In 1.4 million colors at 640 x 480 resolution.

For world travelers, the PanelBook supports NTSC, PAL and SECAM video standards and has a universal power supply.

As easy to use as it is to carry. Setup is a snap. Just plug it into most any PC or Mac, and place it on an overhead. That's all there is to it.

The secret is in the drawer. How'd we make it so small? We started with a 9.4" LCD and an innovative design for the future. Unique optics project the PanelBook's image to about the same size as much larger LCDs.

Our new PanelBook just happens to be one of our biggest breakthroughs. Or would that be the smallest?

FOR MORE INFORMATION & A FREE PRESENTER'S IDEA GUIDE, CALL 1-800-327-7231.

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The HP 4L isn't bad, but

THE HP 4L

There's only one option on the HP 4L. A memory upgrade from 1MB to 2MB.

The HP 4L is a good laser printer. Just limited.

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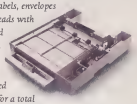
it's no ActionLaser 1500.

Epson's RITech (Resolution Improvement Technology) increases the ActionLaser's normal 300 dpi print quality to eliminate jagged edges right where you need it: in the curved lines of letters, numbers and images. And Epson's MicroArt printing technology gives you deep, dark blacks and incredibly fine lines.

27 fonts (13 scalable) are standard. Should you expand your typographical horizons, unlimited fonts are easy to install via HP-compatible plug-in cartridges, available anywhere. The HP 4L doesn't accept HP's cartridges.

The ActionLaser has 150 sheet paper capacity (letter or legal), and handles stacks of labels, envelopes and overheads with ease. And there's an optional 250 sheet auto-feed cassette, for a total of 400 sheets. The HP 4L holds 100 sheets. Envelopes, labels and overheads are manually fed, one at a time.



The ActionLaser 1500's top speed is six ppm. That's seriously fast, fifty percent faster than the HP 4L.

If you have a DOS machine, but decide to get a Macintosh, do you need a new printer? Not with an ActionLaser 1500. Just add our EpsonTalk interface and your Mac plugs right in.

The ActionLaser 1500 comes standard with parallel and serial interfaces that allow two users to share a single printer. Add another interface and a third user can share the same printer. The ActionLaser 1500 can connect to everything from PCs to IBM mini and mainframe computers. The HP 4L has one interface.

THE EPSON ACTIONLASER 1500

It's easy to add more memory. Just pop in inexpensive, industry standard DRAM chips, for a maximum of 5 MB. The HP 4L only goes up to 2 MB.

PCL 5 emulation is standard. The extra power of Adobe PostScript is a simple plug-in option. With HP, you have to buy another printer to get PostScript.

PC Computing Best Buy. (June 1993.) The word is getting around. The Epson ActionLaser 1500 is the best choice in personal lasers.

The ActionLaser 1500 comes with Epson's limited two year warranty. HP offers one year. For help, call the Epson Connection. Quite possibly the best help line in the business. And it's free.

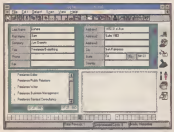
Don't buy a laser with a limited future. Buy one that is able to expand for the future. Compare, and you'll see why the speedy, inexpensive ActionLaser™ 1500 is the one laser worth owning. For information on the Epson ActionLaser 1500, our ink jet and dot matrix printers, or scanners, call the Epson Connection℠ at **1-800-BUY-EPSON** (800-289-3776).

EPSON®

TRADEMARK OF SEIKO EPSON CORP ©1993 EPSON AMERICA, INC., 20770 MADRONA AVE., TORRANCE, CA 90503 FOR DEALER REFERRAL OR WARRANTY DETAILS, CALL 800-BUY-EPSON (800-289-3776) IN CANADA, CALL (800) GO-EPSON FOR LATIN AMERICA, 305-265-0302

Business-Card Scanners—Text Recognition for the Real World

WATCH THIS SPACE
Micratek's is the first business-card scanner in the field, but it's not the only player. We received promising news of value-added software that converts your existing scanner into a heavy-duty



business card reader and contact-management tool. CypherTech's CypherScan HF family of products (software shown above) provides several layers of notes fields and more options than the Micratek's software (bottom screen). We will review the hand-scanner and flatbed versions of the

software ($145 and $395 respectively), as well as a dedicated scanner such as Micratek's in a forthcoming issue. (CypherTech; 408-734-8765)
Circle Reader Service No. 609

SCANNERS HAVE ALWAYS been slick tools, but nobody's ever accused them of being very versatile. You can scan in text or little graphics, but the cost is still hard to justify. Not so with the latest offering from Microtek.

The Microtek Scan-in-Dex is a single-purpose scanner about the size of a Rolodex—and amazingly, that's exactly what it replaces. Slip a business card in the business end of the Scan-in-Dex and the Windows software does the rest. It takes the card's image, performs OCR on the text, and works artificial intelligence on the results to add the information to a database. The result: Names, addresses, company names, phone and fax numbers end up in the appropriate fields, and anything else ends up in a Notes bit bucket.

In general, the software's combination of zone recognition and a vocabulary of giveaway terms (such as street, manager, and company) does a good job of slotting the right words in the right place. In the few cases we encountered where e-mail addresses were misread as company names, the program's drag-and-drop support made it easy to change the location of fields.

What's the Word?

The real test of any scanner that turns hard copy into online text is the strength of its character recognition. Our tests turned up surprisingly good results from the Scan-in-Dex. Typically, OCR doesn't do a good job of small point sizes such as those on business cards, but contrary to our expectations, cleaning up the text after scanning wasn't too arduous. True, few cards came out with no recognition or placement errors at all, but the errors we found were quick and easy to fix.

There are exceptions to the good recognition rule. Colored cards lower the accuracy of the OCR, and white text on a dark background stumped the software altogether. The bottom line: It was quicker to scan a card and fix errors than to enter details by hand.

The Scan-in-Dex software's uncluttered card-by-card view shows all pertinent information about the card you scanned most recently—but that's no way to manage your contacts. There's a rudimentary search

We wish we had thought of it. Business-card scanners like Micratek's are headed for corporate boardrooms everywhere—but they're not perfect.

function that looks through your database for a name, company, title, or some element of the address. This works well enough, but it doesn't have fuzzy searches (you'll pull your hair out when your spelling fails).

The list view of your contacts is a little better—it looks like a spreadsheet, sorted by last name, and you can cut and paste cells, columns, rows, or the whole table. Unfortunately, when you copy more than one column, the information comes through as a continuous string of text—only a single space separates each column, not the tabs you'd expect from a spreadsheet lookalike. This makes sharing the data using usual Windows conventions inconvenient—but it's possible to export data into more robust contact and personal-information management software.

There's been a crying need for this kind of scanner for years, and this is a respectable first foray in the field. Our wish list is long—we'd like to see a parallel-port version that you could take to conventions (where business cards fly like confetti), better recognition of low-contrast text, and the ability to generate phone lists and other reports. If you can do without these niceties, this is one slick business tool. **MATTHEW LAKE**

SCAN-IN-DEX • $399 • MICROTEK • (213) 321-2121
Circle No. 608 on Reader Service Card

MediaMagic™. The Trick to Mastering Multimedia.

A family of audio boards that perform like magic.

Looking for the ultimate in multimedia sound? Then take a look at what we have up our sleeves. Introducing MediaMagic, a family of Digital Signal Processor (DSP) audio boards and sound systems that bring superior concert-hall sound to your PC.

Whether you need an inexpensive solution for professional digital sound, or a total sound solution with wave table sampling, state-of-the-art, real-time MPEG II audio-data compression, packaged with high-performance SCSI CD-ROM drive, high quality speakers and popular CD-ROM titles, MediaMagic delivers. And if you think that sounds good, you'll really enjoy hearing about MediaMagic's 16-bit digital stereo playback and recording capabilities with full mixing and editing features which add new dimensions to business presentations, educational programs and computer games. What's more, MediaMagic audio boards support MIDI to enhance your applications for original music creation.

Products:	Digital Audio	Up-grades	Wave Table	CD ROM	Real-Time MPEG Audio
MediaMagic DSP-16 Plus	16-bit 48 KHz	Yes	Standard	SCSI	Yes (encode/decode)
Sound Blaster 16 ASP	16-bit 44 KHz	Yes	Optional	Proprietary	No
ProAudio Spectrum-16	16-bit 44 KHz	No	No	SCSI	No

All MediaMagic products are compatible with Windows Sound System applications and DOS-based Sound Blaster™ games providing total compatibility with all current sound applications on the market today.

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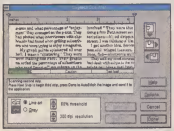
ScanMan EasyTouch: A Cool New Design—And No Card to Futz With

WANT WYSIWYG?
The EasyTouch scanner's FotoTouch software has an innovative monitor-calibration tool. It compensates for one of the worst bottlenecks in image editing: your display system.



Too often, you actually spoil an image to make it look right onscreen; when you print it out, you see the awful truth. The display-calibration tool makes sure what you see onscreen is what you get on the page (bottom screen).

It's easy to use: Just adjust one gray bar until it matches (or nearly matches) a second one.

NO MORE EXCUSES: Injecting life into your documents with grayscale illustrations is a no-brainer now that you don't need to install an interface card to scan them. Logitech's newest ScanMan EasyTouch plugs into a PC's parallel port and scans at a flick of the wrist. The well-designed unit is a deal at $399, and it comes with ultrasmart OCR and image-manipulation software. But for all its benefits, it suffers two major limitations: It's a hand scanner—so you need preternaturally steady hands to make it work right—and it won't work unless plugged into a power outlet.

In designing the EasyTouch scanner, Logitech traded the standard hand scanner casing for a distinctive slice-of-melon design that's easier on the wrists. You rest your fingers on top of the unit and drag it with a straight wrist, using your elbow to pivot.

The EasyTouch scanner's parallel-port adapter, however, is nothing unique. Other no-slot grayscale scanners, including Niscan's impressive Page, incorporate such adapters. And although Logitech provides a pass-through capability so you can share the port with another parallel device, there's no joint on the adapter, so you need at least 6 inches clear at the back of your PC to use it.

Words, Words, Words

A scanner isn't complete without an OCR option, and Logitech licensed one of the best—OmniPage Direct (it won our MVP Award in 1992). Installing it creates a Scan Text menu option in many Windows apps so you can scan, recognize, and import words into your application with a single stroke.

The scanner's text recognition—despite an irritating tendency to misrecognize double-*l* combinations as a *U*—scored highly in our tests using various text types (top screen). Better yet, its ability to scan in multiple text strips and meld them before text recognition takes place simplifies recognition of text that's set wider than the scanner's 4-inch window. But to get halfway acceptable recognition results, you need to scan at an even speed. In our tests, the Niscan Page (see New! July 1992, page 72) consistently turned in better recognition results, although its OCR software isn't as reliable as OmniPage Direct.

Making Art

Where the EasyTouch scanner really shines is in the quality of its 256-grayscale scans. They beat the quality of the rival Niscan Page's grayscale scans by a wide margin (even though it costs half the price). And if you can scan at an even rate, the bundled FotoTouch software avoids the hardware's size restrictions by merging scanned strips.

The image-editing software, with its collection of floating tool palettes, is simple but effective. Even tricky operations like tweaking brightness and contrast settings are made easy, and you get instant preview feedback for each of your settings.

However, like many things that are easy to pick up and use, the FotoTouch software is limited. Its single level of undo and lack of a revert tool are a pain. And although the paintbrush tool comes in a variety of sizes and shapes, the tool that grayscale editing screams for—an airbrush—is missing. You can approximate an airbrush effect by using opaque brushes, but it's not the same.

Bottom line: If you want good OCR, usable but imperfect photoediting software, and good, slotless grayscale scanning on a $400 budget, you need two things—a steady hand and the ScanMan EasyTouch. **MATTHEW LAKE**

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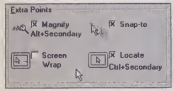
BallPoint 2.0: As Smart as Attachable Pointing Devices Get

THE SOFTWARE LEAD

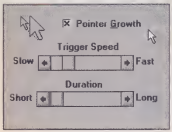
Hardwore ergonomics toke you only so far. Fortunately for the BallPoint's torget audience of portable-computer users, the software thot accompanies the



device is looded with smorts.

The slickest feoture is Snop-to (top screen), which outomotically sends the mouse cursor to the defoult button in ony dialog box you pop up. Try swooping your trockboll while on o cromped plone—you'll oppreciate the economy of movement Snap-to ollows you.

The Screen Wrap feature is hondy—but it also tokes getting used to. When you move the mouse pointer off the edge of the screen, the



cursor reoppeors on the opposite side. This lets you quickly move cleor across the screen without elbowing the possenger next to you.

Pointer Growth (bottom screen) enlarges your pointer when you move it quickly across the screen—a big bonus.

IT'S TOUGH TO teach old dogs new tricks. If you don't already love the original BallPoint, Logitech's TrackMan Portable, or Appoint's Thumbelina, Microsoft's new BallPoint Mouse 2.0 for portable computers probably won't make you an instant convert. Even so, of all the attachable notebook pointing devices around, this is the least annoying—and that's rare praise.

Although it's basically the same idea as its predecessor, but in a curvier package, BallPoint 2.0 offers some thoughtful hardware improvements. The clip-on feature lets you close the lid of your notebook PC with the mount attached. Score one for Microsoft. Also, the trackball is easier to operate because Microsoft replaced the cylindrical roller bearings of the original BallPoint with ball bearings—so the ball rotates more smoothly. We found the new BallPoint much easier to control than other external trackball devices.

Another hardware improvement sounds minor on paper but is significant when you hold the device in your hand: the ergonomic contouring Microsoft applied to the outside rim and the primary mouse buttons. The new BallPoint feels better in both big and small hands, and the new contoured buttons keep your finger on the trigger.

Better Software

BallPoint 2.0 includes a slight revision of the Version 9.0 mouse driver—Version 9.01. Several features in the new desktop mouse driver were designed with Microsoft's standard mouse—not the BallPoint—in mind. In fact, the new driver's Mouse Manager Control Panel applet is sort of a junior version of some of the third-party mouse-cursor utilities that were aimed primarily at notebook users, such as Magic Cursor from Fanfare Software.

The new driver offers three mouse-pointer sizes, and you can change the cursor to black or other colors. You can also have it inherit colors around it in chameleonlike fashion as you move it around the screen.

One of the best features of the desktop driver is Pointer Growth (see "The Software Lead" at left), which automatically enlarges the pointer whenever you move it rapidly across the screen. When you stop, the pointer shrinks back to normal size. You can specify the speed at which the cursor must move before the pointer grows to one of two larger sizes. You also can control how long the cursor will stay large after you stop moving. Pointer Growth is a great feature for keeping track of the pointer, although it doesn't work perfectly in every application. Locate is another notebook-oriented feature that helps you find a lost cursor by employing a user-selectable key-and-mouse-click combination to center the cursor in the middle of the screen. We loved it.

Unlike the previous BollPoint, the new one lets you close your notebook with the mount ottached. Finolly there's on end to the clamp-on, clomp-off gome.

The Verdict

So is BallPoint a must-have? If you routinely pack a desktop mouse when you travel, you'll probably continue to do so in spite of the new BallPoint. But if you're willing to tolerate the inconvenience of an attachable pointing device, BallPoint 2.0 is the best of its ilk. **SCOT FINNIE**

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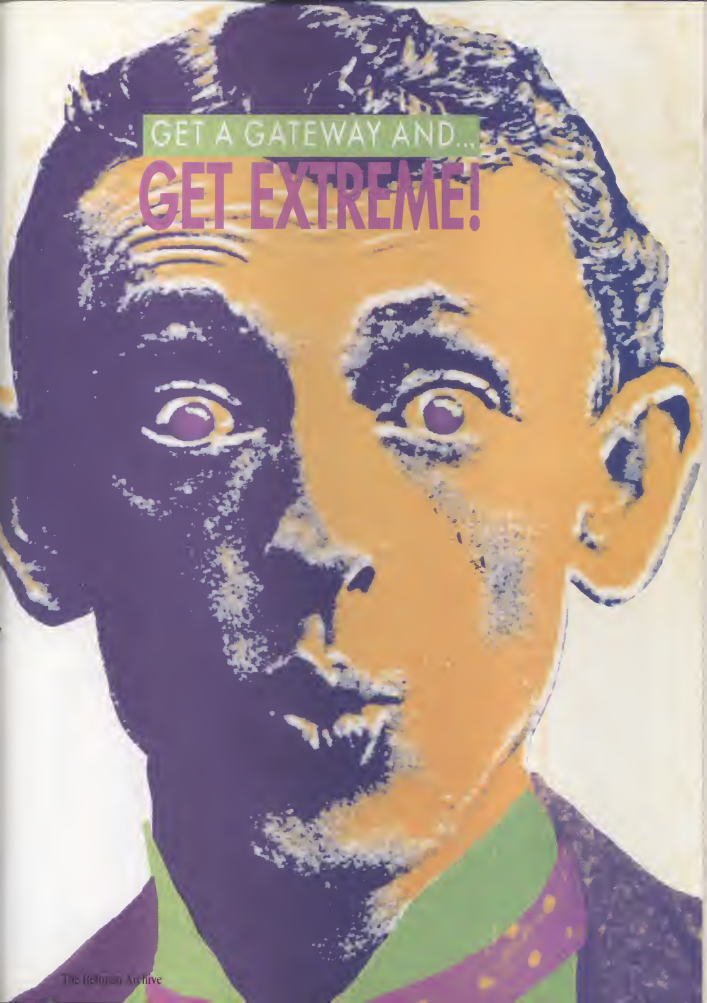

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Although everyone tries to catch us — they can never keep up. Our latest ATI Ultra XLR video card still sets the standard for VESA graphics performance. The Ultra XLR also comes with special drivers to accelerate tomorrow's video and multimedia applications. And you get a brilliant, crisp display with our 15-inch CrystalScan® non-interlaced, .28 dot pitch color monitor.

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Secondary caches unlock the full performance potential of your CPU. Gateway VESA systems come standard with 128K cache, and the award-winning DX2-66V with 256K cache.

Your Choice of Software

Only Gateway gives you a choice of top-shelf application software. VESA local bus and PCI systems include options like Microsoft® Word for Windows,™ MS Excel,™ Borland® Paradox® and Quattro® Pro for Windows, and more. Then we add Central Point's Tools on Top™ utility software, based on the award-winning PC-Tools for Windows. Systems with a CD-ROM drive include Gateway's famous

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Don't settle for a rigid 101-keyboard when you can have the flexibility of Gateway's exclusive 124-key AnyKey keyboard with programmable macros and keyboard remapping capabilities.

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CD-ROM Drive

All DX2 systems come standard with a CD-ROM drive, giving you access to exciting new applications, databases and entertainment programs. All Gateway systems can be easily upgraded to include a CD-ROM.

Expandability

For those of you who still want to jazz up your PC ensemble, we're giving you all the instruments you need for expansion. You'll get 4 external drive bays for floppies, a CD-ROM drive, tape backup, and don't forget all the medias of the future. Three internal drive bays allow you to easily add hard drive space. Two VESA slots guarantee upgradeability to tomorrow's totally cool graphics and disk controller technology; and 5 ISA slots are compatible with 16-bit technologies.

Gateway has always had a reputation for marching ahead of the crowd by giving you the ***greatest*** values. Our award-winning VESA systems are no exception. Call Gateway 2000 today and ask your sales representative for more information on these VESA local bus systems.

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Check out Gateway's new 4DX2-66 mini desktop — it's a small package that packs a big punch for under $2,000! While other companies might slash their prices, you could get the short end of the stick when it comes to features. Gateway won't short-change you on anything. You get a 66MHz 486DX2 processor, 128K cache, a 340MB hard drive, 4MB RAM and fast video performance. Our 4SX and 4DX models come standard with Microsoft Works™ for Windows; 4DX2 models come with an extended selection of application software. And all mini desktop models come standard with MS DOS® 6 and MS Windows™ 3.1. All application software comes pre-installed on the hard drive at no extra charge.

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You get greater expandability with our new mini desktop cases, measuring 16.9-inches wide, 4.4-inches high and 15.9-inches deep.

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Gateway has always used recycled paper whenever possible. In fact, this advertisement is printed on recycled paper, using soy ink. Recycled paper is used internally for 75% of our printed materials including newsletters, letterhead, envelopes, invoices and sales literature. Soy ink is used to print 100% of these materials.

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All Gateway systems come in boxes made from 50% recycled linerboard. Packaging inside system boxes is made from expanded polyethylene. This environmentally safe packaging contains no CFCs or HCFCs and does not produce any toxic residue when incinerated or deposited in a landfill. Gateway's packaging is recyclable by the manufacturer.

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On-Line Documents And CDs

Gateway's on-line documentation and System CDs also make a positive impact on the environment. Our On-Line User's Guide is fully interactive so you can learn about your Gateway PC without ever opening a manual. And the Gateway

CAN MAKE THE BIGGEST DIFFERENCE

System CD contains software applications including Microsoft's Multimedia Pack. By putting software and manuals on CD-ROM, we reduce paper waste and other environmental costs of software documentation. It's also a way to replace most of the diskettes that would normally come with your PC. CD-ROMs will eventually replace much of the paper materials and thus, save trees.

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Gateway is a corporate sponsor of Global Releaf, a campaign of American Forests, dedicated to the improvement of the world's environment through the preservation and planting of trees and forests. With our donations, Global Releaf planted over 15,000 trees in 1992. You can help restore damaged forest ecosystems in the United States by calling Global Releaf for more information at 202-667-3300.

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Gateway is making significant progress in our development of energy-efficient PCs with power-sensitive monitors, energy-efficient CD-ROM drives, high-efficiency power supplies and video cards, and low-power system boards.

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Be assured that we'll be there for you far into the future. Our financial stability has always held steady in the ever-changing PC industry. And although we're not letting it go to our heads, Gateway is one of the largest PC makers in the U.S. and a Fortune 500 company.

Every Gateway system comes with excellent after-the-sale support. You get a **30-day money-back guarantee**. So, if you're not completely satisfied with your system, you can send it back within 30 days for a refund.

All Gateway 2000 systems have a **one-year limited warranty** and telephone **technical support for the life of the system**. When you need help with your PC, you want someone who will jump through hoops to help you. That's what you'll get with our support departments. In February and again in July of 1993, *PC Magazine* readers gave Gateway an excellent rating for service and reliability. And in June, *BYTE* readers chose Gateway 2000 as the company that provides the best service in the industry.

Gateway's **automated fax service** will supply you with detailed documentation on over 150 technical subjects. You'll also get **a lifetime BBS membership** for additional technical support and on-line forums.

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- New Mini Desktop Case
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- Intel 66MHz 486DX2 Processor
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- 340MB 13ms IDE Hard Drive
- Intel Pentium Technology Ready
- Local Bus Graphics Accelerator w/ 1MB DRAM
- 14" Color CrystalScan 1024NI
- New Mini Desktop Case
- 5 16-Bit ISA Slots
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- MS-DOS, Windows & Tools
- Choice of Application Software

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4DX-33V

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- Local Bus IDE Interface
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- New Baby AT Case
- 5 ISA & 2 VESA/ISA Slots
- 124-Key AnyKey Keyboard
- Microsoft Mouse
- MS-DOS, Windows & Tools
- Choice of Application Software

$1995

4DX2-50V

- Intel 50MHz 486DX2 Processor
- 8MB RAM, 128KB Cache
- 3.5" Diskette Drive & CD-ROM
- 340MB 13ms IDE Hard Drive
- Local Bus IDE Interface
- Intel Pentium Technology Ready
- VLB ATI Ultra XLR Graphics w/1MB VRAM
- 15" Color CrystalScan 1572FS
- New Baby AT Case
- 5 ISA & 2 VESA/ISA Slots
- 124-Key AnyKey Keyboard
- Microsoft Mouse
- MS-DOS, Windows & Tools
- Choice of Application Software

$2295

66MHz Best Buy

- Intel 66MHz 486DX2 Processor
- 8MB RAM, 128KB Cache
- 3.5" Diskette Drive & CD-ROM
- 340MB 13ms IDE Hard Drive
- Local Bus IDE Interface
- Intel Pentium Technology Ready
- VLB Graphics Accelerator w/1MB DRAM
- 15" Color CrystalScan 1572FS
- New Baby AT Case
- 5 ISA & 2 VESA/ISA Slots
- 124-Key AnyKey Keyboard
- Microsoft Mouse
- MS-DOS, Windows & Tools
- Choice of Application Software

$2495

4DX2-66V

- Intel 66MHz 486DX2 Processor
- 16MB RAM, 256KB Cache
- 3.5" Diskette Drive & **2X CD-ROM**
- 424MB 13ms IDE Hard Drive
- Local Bus IDE Interface
- Intel Pentium Technology Ready
- VLB ATI™ Ultra XLR Graphics w/1MB VRAM
- 15" Color CrystalScan 1572FS
- New Baby AT Case
- 5 ISA & 2 VESA/ISA Slots
- 124-Key AnyKey Keyboard
- Microsoft Mouse
- MS-DOS, Windows & Tools
- Choice of Application Software

$2995

P5-60

- Intel 60MHz **Pentium**™ Processor
- 16MB RAM, 256KB WriteBack Cache
- 3.5" Diskette Drive & 2X CD-ROM
- 424MB 13ms IDE Hard Drive
- PCI ATI Ultra XLR 2MB Graphics
- 15" Color CrystalScan 1572FS
- New 300W Tower Case
- 4 ISA, 2 PCI & 1 PCI/ISA Slots
- 124-Key AnyKey Keyboard
- Microsoft Mouse
- MS-DOS, Windows & Tools
- Choice of Application Software

$3595

NOMAD 450DXC

- 50MHz 486DX2 Intel Processor
- 8MB RAM
- 3.5" Diskette Drive
- 200MB IDE Hard Drive
- **8.4" Color Active Matrix Screen**
- Simultaneous Video with 1MB
- Size 8.5" x 11" x 2.2", 6.2 Lbs.
- NiCad Battery & AC Pack
- 1 Parallel / 1 Serial Port
- 79-Key Keyboard & MS Ballpoint
- MS-DOS, Windows & Works for Windows

$3995

Software Choices

If a system comes with "choice of application software," choose one of the following packages:

- Microsoft Excel for Windows™
- Microsoft Word for Windows™
- Microsoft Word and Bookshelf'92® CD-ROM Edition
- Microsoft PowerPoint for Windows™
- Microsoft Project for Windows™
- The MS Entrepreneur Pack(Works, Publisher, Money, and games)
- Borland Paradox® and Quattro® Pro for Windows

Due to the volatility of the DRAM market, all prices are subject to change. Details about our warranty,guarantee and on-site service program are available upon request.

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AND THE HOTTEST SOFTWARE & PERIPHERALS

SOFTWARE

Microsoft Office™ — You can upgrade from a choice of application software to Microsoft Office, CD-ROM version, for only **$99**! This single package has all the leading Windows applications: Word, Excel and PowerPoint. The diskette edition of MS Office is also available as an upgrade from a choice of application software for **$175**, or **$499** as a second application.

Choice of Application Software — If the system you want comes with MS Works for Windows, you can upgrade to a choice of application software for only **$100**.

PERIPHERALS

Multimedia Upgrade Kit

Everything you need to add multimedia to your PC is included in this specially priced kit! You get:

Sound Blaster™ 16 Sound Card with Advanced Signal Processing. Simply the best sound card available! This 16-bit PC audio card offers CD-quality sound, Yamaha® FM music synthesizer, MPU-401 MIDI interface, joystick connector, built-in CD-ROM interface, and more. The Advanced Signal Processing chip delivers 4:1 real-time hardware data compression while reducing CPU demands by up to 65%. Provides 100% compatibility with all Sound Blaster applications, plus DOS and Windows sound support. You also get two Labtec™ speakers that attach to your PC monitor.

CD-ROM Drive. Kit comes with the same high-quality drive that we offer in our top-of-the-line 4DX2-66V system. You also get our free system CD with Microsoft Multimedia Pack™ and more!

Kit Price (with system purchase): **$395**

Sound Kit

Get just the Sound Blaster 16 Advanced Signal Processing sound card and two Labtec CS-180 speakers. **$195**

TelePath™ Fax/Modem

Internal fax/modem, 14,400bps modem, V.32bis, with 9,600bps fax capability. Package includes data communication software plus a free CompuServe® trial membership. **$195**

Network Cards

Call for a selection of Ethernet cards and Token Ring adapters, installed and configured.

Microsoft Windows™ for Workgroups

Networking made easy! Share files and printers, send electronic mail, schedule group meetings with the click of your mouse — and get everything you need in one inexpensive package. Price includes an Ethernet adapter and software. Hardware and software are factory-installed. **$159**

Colorado Memory Systems™ TBU

250MB internal automatic tape backup unit copies up to 9.5MB per minute with high-speed data compression. Comes with easy-to-use DOS software, one tape and cable. **$175**

CrystalScan® 15-Inch & 17-Inch Monitors

Non-interlaced, .28 dot pitch color monitors. If your system comes with a 14-inch monitor, you can upgrade to the 15-inch model for **$100**, or the 17-inch for **$600**. If your system comes with a 15-inch monitor, you can upgrade to the 17-inch monitor for **$520**. (Prices good only for upgrades at the time of system purchase.)

Panasonic® KX-P2123 Color-Capable Printer

Add color to your documents with this 24-pin dot matrix printer. Includes Adobe Type Manager.® Call for price!

Epson® Stylus™ 800 Ink Jet Printer

Great laser quality at an even greater value. Measuring only 17 inches by 10.5 inches, the Stylus 800 has 7 different typefaces and prints an extra-quiet 150 characters per second at 360 d.p.i. Parallel cable included.

Gateway 2000 Price	**$339**
Epson Mail-in Rebate*	**–$50**
After Rebate Cost	**$289**

*Your mail-in rebate will be delivered with your Epson printer. This special price is only good for orders taken through October 31, 1993.

Call and ask about our full-line of ink jet and laser printers.

The software and peripherals listed here are sold only with the purchase of a system. For details on our complete line of extras for Gateway customers, ask for our special add-on components division when you call.

We offer many other system options and upgrades. Call today!

SERVICE

Every Gateway 2000 system is backed by:

- 30-Day Money-Back Guarantee
- One-Year Limited Warranty
- Lifetime Toll-Free Technical Support
- On-Site Service Available to Most Locations
- Lifetime BBS Membership
- FaxBack® Automated Fax Service

MICROSOFT® WINDOWS™ READY-TO-RUN

TOOLS TOP FROM CENTRAL POINT

Tools on Top™ is now included on all Gateway 2000 mini desktop, desktop and tower systems. Program includes file manager, desktop and emergency disk portions of Central Point's award-winning PC Tools for Windows

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Prices and configurations are subject to change without notice. Prices do not include shipping.

Multimediaholics and Networks: A Six-CD Drive Has Your Number

DO THE MATH

The DRM-604X isn't just great—it's cheap, especially for network users. You have two choices if you want to make six CD-ROM discs available across a network. You can purchase the DRM-604X for approximately $1,250 on the street or buy six individual CD-ROM drives for a total of approximately $2,700.

The DRM-604X uses only one read mechanism, which means that each time you run a different application the drive has to swap discs. If performance is your main goal and you expect many users to constantly hit on the CD-ROM discs, you'll get better speed with individual drives. But if members of your workgroup primarily need to access data or applications on more than one CD-ROM disc, Pioneer's DRM-604X is unbeatable.

Because the DRM-604X is a SCSI device, you can daisy-chain up to seven devices from a single SCSI host adapter. At six CD-ROM discs per drive, that's 42 discs—or more than 27,300MB of CD-ROM data available online!

HERE'S A PRODUCT to die for. To multimediaholics, switching between CD-ROMs is as tedious as changing floppy disks was in the prehistoric days when applications had to be run from floppies. That's why we're head over heels in love with Pioneer's new DRM-604X CD-ROM drive, which gives you convenient access to multiple CD-ROMs. The drive lets you automatically switch between six discs, making a one-at-a-time CD-ROM drive look like a clumsy relic from the past.

The DRM-604X connects to a SCSI host adapter. It can run at normal speed to play audiodiscs, or it can upshift and transfer data at four times normal speed for high-bandwidth, networked multimedia apps.

Almost Plug and Play

Installing the unit is child's play. First, connect the drive either directly to the host adapter or to another SCSI device in a daisy chain. Like other standard SCSI peripherals, the last device in a SCSI chain must be terminated. Pioneer has built a terminator into the DRM-604X: Just flip a switch to set the terminator on or off.

Once you've physically installed the drive, the only remaining step is to install the software. Because it's a SCSI device, the host PC must have a SCSI-2 host adapter installed. The included device drivers support host adapters from Future Domain, IBM, and any adapter that supports the Advanced SCSI Protocol Interface (ASPI) specification. On our test machine, a Compaq Deskpro 4/33i with a Future Domain SCSI host adapter, installation was quick and easy.

Say good-bye to the CD-ROM shuffle. Cram six CDs into Pioneer's new drive and you'll never go back. And you'll pay less than half the price of six individual drives.

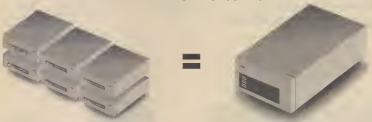
The included device-driver software uses only one SCSI ID number (out of a possible seven) but lets you assign each CD-ROM to a different drive ID. For example, we installed *Encarta* as drive D:, *Microsoft Bookshelf* as drive E:, and so on. Load up a few huge CDs, switch effortlessly between discs, and you'll never go back to standard CD-ROM drives.

The Price Is Right

At a list price of $1,845, Pioneer's product is an unbelievable bargain. It costs much more to purchase six individual drives—a fact few CD-ROM users are aware of. It would cost about $2,700 on the street to purchase six CD-ROM drives, as opposed to a street price of about $1,250 for Pioneer's drive (see "Do the Math" at left). If you find yourself spending more time switching CD-ROMs than referencing *Bookshelf for Windows*, load your six favorite discs into the Pioneer DRM-604X, and kiss the CD-ROM shuffle good-bye forever. **DALE LEWALLEN**

ATTENTION! ARE YOU OVERPAYING FOR CD-ROM?

On networks, standard CD-ROM drives get mighty pricey.



Six double-speed CD-ROM drives $2,700 **Pioneer DRM-604X $1,250**

Based on street prices from a major mail-order company.

PIONEER DRM-604X • $1,845 (LIST PRICE) • PIONEER NEW MEDIA TECHNOLOGIES • (310) 952-2111

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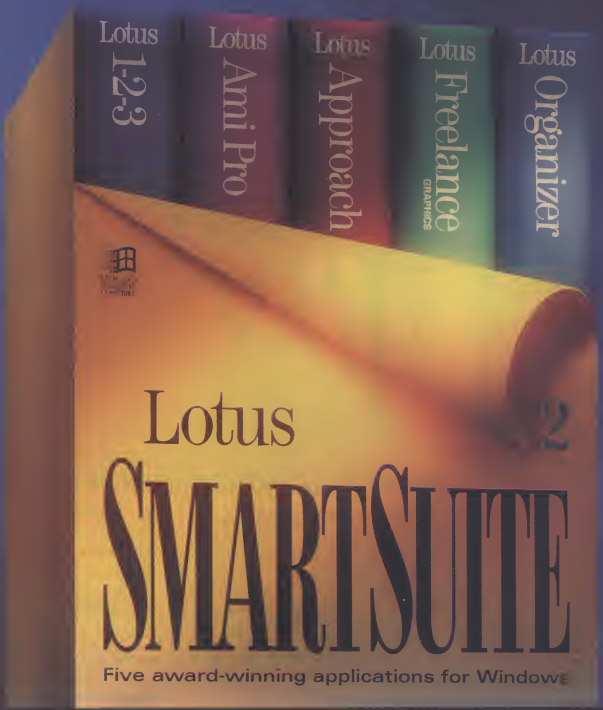


TO WINDOWS USERS, IT'S A "BUNDLE OF JOY."

– *PC Letter* 6/7/93

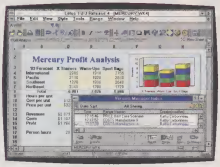
(TO MICROSOFT, IT'S PANDORA'S BOX)

Thousands of DOS users who wouldn't move to Windows™ for Microsoft® Excel are jumping for Lotus® 1-2-3® Release 4. As are many who already use Windows.

And they're getting a spreadsheet that's not only much easier for them to use, but a lot more powerful in a lot of ways.

The new 1-2-3 is the first spreadsheet designed to help people work the way they want to work. Which is often together.

A raft of powerful new usability features makes 1-2-3 easy to learn and a pleasure to use. These include a context-sensitive user interface. A Live Status Bar. In-Cell™ Editing.



One-step charting. A completely new graphical interface for database queries. And Worksheet Tabs for 3D spreadsheets that make labeling and manipulating the work much easier.

The close integration of 1-2-3 with oth Lotus Windows desktop applications lets you easily transfer 1-2-3 information, form and processes to other applications whe you need them. But it's the Version Mana and other Working Together® features, th turn the 1-2-3 spreadsheet into a pote workgroup tool by letting people share and track information in new ways.

See for yourself. Visit your Lotus Author ized Reseller or call **1-800-TRADEUP, ext. 9422*** to upgrade for just $119 direct fro Lotus. Or ask for a free demo disk. But first, turn the page and let's talk word processor

Lotus.
Working Together

*In Canada, call **1-800-GO-LOTUS** *1993 Lotus Development Corporation, 55 Cambridge Parkway, Cambridge, MA 02142. All rights reserved. Lotus, 1-2-3 and Working Tog

"The SmartIcons in 1-2-3 for Windows are smarter and Lotus's approach to swapping different tool-bars in and out beats Excel's and Quattro Pro's."

PC/Computing 6/93

"1-2-3 LEAPFROGS EXCEL AND QUATTRO"

"Lotus's version manager blows away similar features in Excel and Quattro Pro."

Walter S. Mossberg,
Wall Street Journal 7/29/93

–*PC World* 6/93

"Users who often collaborate on developing and refining worksheet data...will find Release 4 indispensable."

PC Week 5/3/93

"1-2-3 for Windows has always had more powerful database features than Excel or Quattro Pro and now these features are also easier to use."

BYTE 6/93

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Lotus AMI PRO 3

Lotus

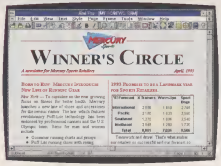
AMI PRO

Word Processor for Windows

Software reviewers and industry experts have convincingly and consistently chosen Lotus® Ami Pro® as the best word processor over both Microsoft® Word and WordPerfect® for Windows.™

Again, in the August, 1993 *PC/Computing Face-Off*, Ami Pro soundly beat Word and swept both DOS and Windows versions of WordPerfect in 8 out of 8 categories.

If you're in the least nervous about leaving WordPerfect, or think Word is the easiest way to face Windows, Ami Pro will feel like a breath of fresh air. Because no one comes close to Ami Pro for making even the most complex



documents fast and easy. Using customizable, editable SmartIcons® that give you one-click access to most tasks, and a SwitchKit that takes any trauma out of leaving WordPerfect, you'll understand why new Ami Pro users rarely bother to open the manual.

Then consider the advantages of Ami Pro's tight integration with 1-2-3® and the other Lotus applications. With Ami Pro, you can not only exchange data, charts and functions with the other applications in a click, you can easily create hot links between applications.

Enough words. Visit your Lotus Authorized Reseller or call **1-800-TRADEUP, ext. 9422*** to order. Or ask for your free, full featured working model. Meanwhile, how happy are you with your presentation graphics software?

Lotus.
Working Together

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"AMI PRO 3.0 TAKES THE LEAD OVER MICROSOFT WORD AS THE WINDOWS WORD PROCESSOR TO BEAT"

– *InfoWorld* 9/28/92

"Ami Pro 3.0 comes close to being perfect... It stands above Word and WordPerfect in both its function and in its speed."
Home Office Computing 1/93

"You can learn to use Ami Pro, the Lotus word processing program for Windows, in about a day. Put the manual in a drawer as a first step."
Forbes 2/1/93

"Usability, features, and performance – Ami Pro is the overall winner."
PC/Computing 8/93

"Users moving to Windows from DOS can fearlessly choose the latest Ami Pro Version."
PC World 3/93

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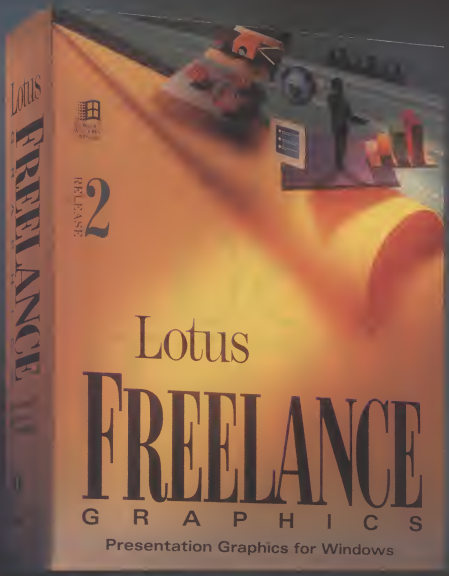
Circle 135 on reader service card.



Year after year, Lotus® Freelance Graphics® has dominated both Harvard Graphics® and PowerPoint® in industry awards. This year, Freelance Graphics 2.01 has again set new standards, winning top ratings from InfoWorld, PC/Computing, BYTE and Windows Sources.

Historically, building professional looking presentations, even with the best software, has been time-consuming work. But with Freelance Graphics 2.01, it's so simple and so fast that people are now punching out charts for small presentations and even for hand-outs used at informal meetings.

One click is all it takes to access some of the most powerful features in Freelance

Graphics, like more than 65 SmartMaster™ design sets, 500 symbols and 100 chart styles. And when you're done, you can turn four-color overheads into black-and-white hand-outs with just one click.

The integration of Freelance Graphics with other Lotus applications is so complete that if you bring your 1-2-3® data into a Freelance presentation, and you later change a number in your 1-2-3 spreadsheet, it will be instantly reflected on the Freelance chart.

For your own live presentation, visit your Lotus Authorized Reseller. Or call **1-800-TRADEUP, ext. 9422*** for a free, full-featured working model. By the way, have you ever used a database?

Lotus
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"Freelance is as close to presentation perfection as you'll find on any shelf."
Windows User 8/93

"Creating a presentation of even (100 slides) is absurdly easy--and much easier in many ways than with competing products..."
PC Week 2/15/93

"LOTUS FREELANCE GRAPHICS FOR WINDOWS SCORE: 9.2"

– *Software Digest* 7/93

"MICROSOFT POWERPOINT FOR WINDOWS SCORE: 7.9"

– *Software Digest* 7/93

"(Freelance Graphics) outclasses the competition in features and ease of use."
InfoWorld 6/21/93

"The users in this study were more productive, more effective, and more satisfied with Freelance Graphics than PowerPoint...PowerPoint users took 64% more time to complete their presentations."
Usability Sciences Corp. 3/93

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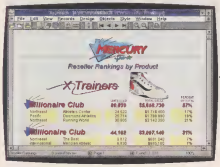
Award-winning Lotus® Approach™ defines a whole new database category: the full powered client/server relational database for the general business PC user. No longer do you have to be a programmer, or think like one, to experience the everyday advantages of a relational database.

Now you, yes you, can build and use your own databases as easily as you build and use your own spreadsheets. For sales reporting, invoicing, project management, customer tracking, mailmerge or hundreds of other uses. Now PC users can enjoy easy, one-click, high-performance access to company data stored in all the major formats (including dBASE® Paradox® FoxPro® Oracle® SQL, SQL Server and DB2®*) across all popular networks.



If you've never worked with a Windows™ database, or if you bought Paradox or Access only to find they were unworkable, Approach will change everything. An independent study found that Approach users are up-to-speed and producing real results in two hours.**

And because Approach is designed to share with other Lotus Windows applications using Approach databases to mailmerge with Ami Pro,® to share data with 1-2-3® spreadsheets, or to simply report on data is something anyone can do.

What a difference a database makes. Visit your Lotus Authorized Reseller or call **1-800-TRADEUP, ext. 9422**.* Or get the whole suite and save a few hundred bucks.

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*In Canada, call **1-800-GO-LOTUS** **Market Probe International, May 1993 *Requires MicroDecisionware Gateway **Reprinted from Windows Magazine with permission *©1992 by CMP Publications Inc. 800 Community Drive
Windows is a trademark of Microsoft Corp. Approach is a trademark of Approach Software Corporation, a wholly owned subsidiary of Lotus Development Corporation. dBASE and Paradox are registered

"...Approach offers much easier-to-use database-creation tools for individual users and easier access to big-time databases than either Microsoft Access or Paradox/Windows...Approach is a big, big winner."
PC Week 6/28/93

"APPROACH... IS BOTH PRODUCTIVE AND HIGHLY USABLE.

"...Approach 2.0 is one of the few (software) packages...for which it's truly possible to never open the manuals."†
Windows Magazine 12/92

ACCESS WILL BE TOO OVERWHELMING FOR END-USERS..."

– *InfoWorld* 1/17/93

"Best Buy Approach is the simplest and most straightforward relational database."
PC World 6/93

"The most usable Windows relational database ever."
PC/Computing 8/93

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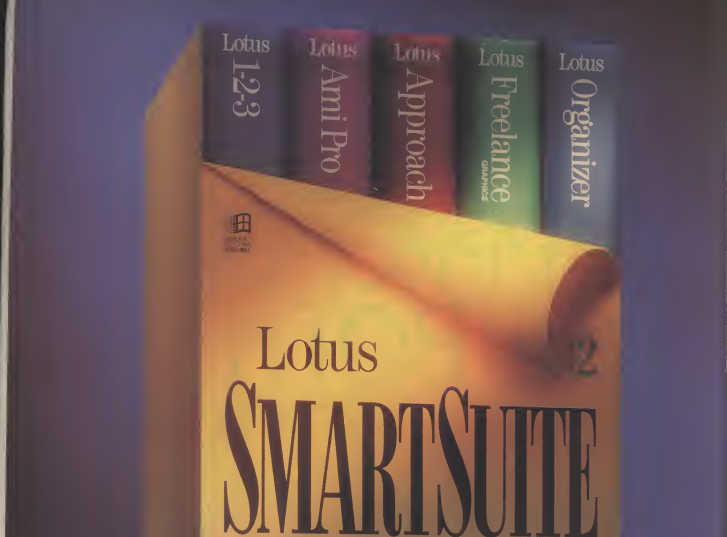


The new Lotus® SmartSuite™ 2.1 is the most complete desktop solution for Windows™ users. It brings together 1-2-3® Release 4, Ami Pro® Release 3.01, Freelance Graphics® Release 2.01, Approach™ 2.1 and Organizer™ 2.1 at an irresistible price (upgrade for just $299***). But it's much more than a deal on an all-star collection of Windows applications.

The applications in SmartSuite 2.1 are closely integrated, sharing a consistent appearance and behavior. This reduces the time it takes for a user to learn each application. For example, the three most used applications in SmartSuite share 26 common SmartIcons® (In Microsoft® Office, they share 3).

Far beyond anything possible with Microsoft Office, Lotus's integration also simplifies the process of switching between applications, sharing information across applications and using functions from one application while working within another.

For example, you can easily edit 1-2-3 charts from within Freelance Graphics. Or use Freelance, or 1-2-3 functions within Ami Pro. All work easily with the Approach database. And all support industry standards, so they'll work with offerings from other vendors as well. This makes working in each application, and the entire Windows platform, easier and more productive than ever before.

Lotus SmartSuite also includes a personal information manager, the award-winning Lotus Organizer.

SmartSuite is also designed for working in groups in ways Microsoft Office can't. All applications are network ready and mail enabled with ccMail™. The results of Working Together® are easily manageable through 1-2-3's Version Manager. And each application features additional enhancements for full integration with Lotus Notes.***

Unlike Office users SmartSuite users can call a single toll-free number for support.

For the whole story, visit your Lotus Authorized Reseller. Until 12/31/93, you can upgrade from any Lotus or competitive product to SmartSuite 2.1 for just $299.*** Or for a SmartSuite demo disk, call **1-800-TRADEUP, ext. 9422.***

"LOTUS SMARTSUITE REDEFINES HOW APPLICATIONS SHOULD WORK TOGETHER."

"Lotus now has a top rated product in each of a half a dozen categories... Moreover, Lotus products have come to share a great deal of genuine integration..."
*Soft*Letter 5/21/93*

"When you buy...SmartSuite, the pieces really work together!...The point: There's more to a suite than cramming four boxes into a suitcase and cutting the price."
PC/Computing 8/93

"The level of integration in the SmartSuite makes complicated, cross-application tasks easier for users and lets them take full advantage of...the Windows environment."
Datamost 6/15/93

—*PC Letter 6/7/93*

Lotus
Working Together

Canada, call **1-800-GO-LOTUS** **Consult your Lotus Representative for more information on how to incorporate Lotus Notes and ccMail into your communication strategy. ***$299 direct from Lotus. Offer expires 12/31/93. Qualifying competitive products are Microsoft Excel, Borland Quattro* Pro (not including SE) Microsoft Word, WordPerfect, Wordstar* DeskjayWrite* Microsoft PowerPoint, Harvard Graphics, Corel Draw, WordPerfect presentation, Aldus* Persuasion. Qualifying Lotus products include 1-2-3 (excluding 1-2-3 for Home) Symphony, Ami Pro, Freelance Graphics, ccMail and Graphwriter* Lotus Notes and Graphwriter are registered trademarks of SmartSuite and Lotus Organizer are trademarks of Lotus Development Corporation. ccMail is a trademark of ccMail, Inc., a wholly owned subsidiary of Lotus Development Corporation. Quattro is a registered trademark of Borland International, Inc. Wordstar is a registered trademark of Wordstar International, Inc. Deskjaywrite is a registered trademark of International Business Machines Corp. Aldus is a registered trademark of Aldus Corporation.

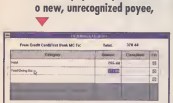
Circle 208 on reader service card.

CPA in a Box: CA-Simply Money Is Money in Your Pocket—Free!

EASY MONEY
Keeping financial transactions up to date is easier than you think. You can enter data in several ways, depending on the account type. For a

checking account, you can use on-screen check or enter data into the account register.

Start typing a payee's name, and CA-Simply Money displays a list of payee names you've entered in the past and tries to identify the one you want. It also inserts the last amount and category you used for that payee (top screen). For a new, unrecognized payee,



CA-Simply Money displays a dialog box that lets you enter details about the payee.

After typing the transaction amount, you can assign a category to it, and perhaps a subcategory (bottom screen).

Distributing an amount across two or more categories is a breeze, and you get plenty of pop-up assistance.

ORGANIZING YOUR FINANCIAL affairs is like exercising: You know you should be doing it, but tomorrow's a better time to start. Now that Kiplinger's CA-Simply Money has joined the ranks of big-league products like Meca Software's Managing Your Money, Microsoft's Money, and Intuit's Quicken, there's one less reason to delay the inevitable—especially at the price.

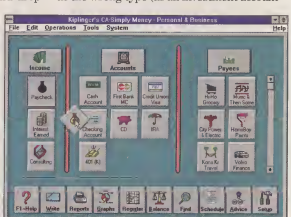
CA-Simply Money is a highly visual program that includes whizzy drag-and-drop operations. It's easy to learn and use, and it handles most financial situations—from a starving student's measly checking account to a budding small business's accounting system. You'll find lots of extras, including predefined reports and graphs, automatic reminders, and budgeting and check-printing capabilities. You can even download stock prices via modem from CompuServe (using your account or a $1-per-minute 900 number).

The first step is to define a *finance group*, which is a collection of income sources, accounts, and payees. You can merge personal and business accounts into a single finance group or keep your business and private affairs separate. The business handles up to ten finance groups.

Like other programs in this genre, CA-Simply Money lets you record all your financial transactions. In the process, you assign each transaction to a category and optional subcategory for tracking and tax purposes. To deposit your paycheck into your checking account, simply drag your predefined paycheck button to the checking-account button. The net pay appears in your account register, and paycheck deductions are categorized accordingly. You also can split a transaction into several categories. For example, you can divide your mortgage payment into principal and interest (calculated automatically).

Customization options abound, so you'll soon have the program humming along the way you want it. Particularly handy is the grouping feature. You can, for instance, create a group of payees that corresponds to your regular monthly bills. When it's time to pay the piper, simply drag this group button to your checking-account button; you'll be prompted to make any payment adjustments.

CA-Simply Money works well, but it lacks some features found in other products such as Quicken and Money. If you set up an account as the wrong type (as an investment account



Recording your paycheck is as easy as dragging the predefined paycheck button to your checking-account button. CA-Simply Money then records the transaction in your account register.

rather than a savings account, for example), you can't change it. You must delete the account and reenter all the transactions. Although it has a lot of pop-up financial advice, the program doesn't warn you if you enter a check number that's been used. And some operations are obscure: If your bank boosts your credit-card limit, for example, the only way you can get to the dialog box to record this information is to change the icon used for the account. Go figure.

Shortcomings aside, this product may be the kick in the pants you need to get your finances in order. Need more incentive? CA-Simply Money is free—at least the first 1 million copies are. Beat that. **ROBIN J. WALDEN**

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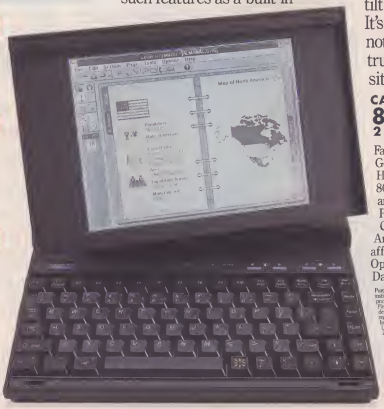

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Acrobat Lite: Replica Is Cheaper, But Munches Disk Space

LESS FILLING?

Farallon's Replica and Adobe's Acrobat both translate files into a format any PC or Mac can read—but at what cost to your disk space? Despite Replica's head start (the software itself takes up about half a megabyte, as opposed to Acrobat's and Adobe Type Manager's 3MB), Replica places a distant second in the space-saving race (see below). Replica's files are typically larger because their compression isn't as good and they can't depend on Adobe Type Manager to recreate fonts. In fact, Replica embeds a sizable chunk of each font's code into its exchange files by default.

So it's not unusual to see Replica files that are four or five times larger than in their native format; Acrobat typically adds just a few kilobytes. If there's little formatting, Replica matches Acrobat's compression—but then, ASCII exchange would do the trick in less space. It's only when dealing with bit-mapped graphics without text that Replica condenses files better than Acrobat—and it shrinks many graphics formats too.

PC/COMPUTING LAB REPORT:
LOSING THE DISK-SPACE RACE

Replica Can Balloon File Sizes

	Spreadsheet File (numbers and charts)	Word Processing Document (multiple fonts)	Bit-Mapped Graphic
Replica	94K	70K	16K
Acrobat	11K	18K	17K
Original	21K	15K	39K

IT'S AN OLD problem. You care about distributing information quickly and with impact—so you do it digitally. But your recipients don't have your software or fonts, which means you use ASCII and rob your documents of their full power.

You've already heard that Adobe Acrobat (see New! August, page 46) solves the problem by creating a file format that retains the look of your documents—but you pay a hefty premium for its viewer. Enter Farallon's Replica for Windows 1.0. Like Adobe's product, it installs as a printer driver and lets you print your formatted, graphics-laden file from any Windows application to a file that retains all the window dressing.

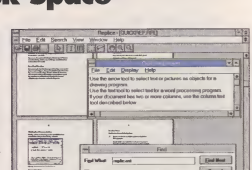
The good news is that Replica costs almost half what Acrobat Exchange costs. Better yet, there's no charge for Replica's file viewer, so you don't have to worry about whether your recipients have the software—you can just send it to them or embed it in the document itself. (You also save $50 for each person you send your documents to—that's the cost of Adobe's Acrobat Reader.)

Like the Original, Only Different

Replica is a breeze to install. And when you need to distribute a file over the network or via an online service, just change your Windows printer driver to Replica on the File menu and choose the Print command. Up pops Replica to show you how the file will look to your audience (a luxury Acrobat doesn't provide). When you're satisfied with the result, save and distribute the file.

Finally, a recipient with even the most modest Windows system can open the file using the freeware Replica viewer—without the need for Adobe Type Manager, which Acrobat requires. In the Replica viewer, you can search for, read, and print information, and even copy text and graphics to the Clipboard to share with other applications.

Sound good so far? It is, but there are problems. In our tests, the default settings produced unattractive results, usually because of font spacing. The default font setting, despite the encouraging name of Optimal Fonts, substituted Arial for any sans-serif font. The result was often scrunched-up text—something Acrobat's Multiple Masters never produced in our tests. Although you can improve the look of Replica documents by selecting the All Fonts option, this swells the file size even further than the default option does (see "Less Filling?" at left).



The Replica viewer isn't just for viewing documents with their formatting intact: You also can do rudimentary searches and copy text to the Clipboard Viewer.

Acrobat: More Extras, More Bucks

Replica also is missing the extensive bookmarking and linking features of Adobe's Acrobat, which makes it hard to navigate larger documents. Replica does offer something resembling a thumbnail view with its double-page 25 percent view, which squeezes four pages onto a Super VGA screen. Another item on our wish list is the ability to add comments to a Replica document.

Nonetheless, Replica is a worthy first solution to the problems of document exchange—and it costs a fraction of what Adobe Acrobat costs. Acrobat is the best product in the class, but Replica is a viable bargain solution.

MATTHEW LAKE

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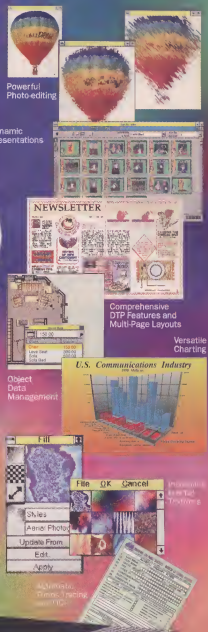

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Bangui Bound? Don't Leave Home without Global Explorer

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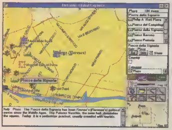
It's not just for pleasure travelers. The *Global Explorer* CD-ROM from DeLorme Publishing provides an astounding amount of detail

about our world. Business travelers—especially those who travel internationally—will find *Global Explorer* ultra-useful.

In addition to maps of every country and street maps for about 100 cities (we'd like to see more), it provides detailed information about more than 140,000 points of interest. When viewing a map, simply



click on a point of interest and *Global Explorer* provides details about it. These screen shots show a bird's-eye view of Europe and Africa (top screen), and a street map of Florence, Italy (bottom).

THERE WE WERE in Bangui when they told us to meet our contact in 12 hours in the Piazza della Signoria in Florence. But we had no clue of how to get to Florence or how to find the piazza. What to do?

Global Explorer from DeLorme Publishing is an excellent solution for world travelers, people who do travel planning, and dreamers. This rich CD-ROM for Windows provides maps and other details of 142,000 countries, cities, historical sites, and other points of interest throughout the world. It also includes demographic, cultural, and economic information for every country. This disc's extraordinary wealth of information more than offsets its minor irritants.

With DeLorme Publishing's *Global Explorer* you can zoom in and out of maps to view a single city block or an entire region or country (see the magnifying-glass tools at lower right).

Besides country maps, *Global Explorer* also includes street maps of about 100 cities—including Florence—and lets you find specific streets by name. If you need to route yourself to a new city, *Global Explorer* shows commercial air routes, even between obscure locations. To get from Bangui in the Central African Republic to Florence, we learned that you fly through Tripoli.

Global Explorer's level of detail shouldn't be surprising; DeLorme is the same company that created the superb *Street Atlas USA*, which shows every street and highway in the United States. Like *Street Atlas*, most of *Global Explorer*'s screen is devoted to displaying maps. You can shift the map in any direction to get details on nearby locations.

You can copy any map to the Windows Clipboard and paste it into other applications. This is useful for creating presentations and necessary for printing maps because *Global Explorer* doesn't have its own printing capabilities (a major annoyance).

If you know the name of a location, simply type it in the Place Text box. But *Global Explorer* can be confusing for more complex tasks, such as searching for specific types of locations, or when you are unsure of a location's precise name. This confusion is caused by some nonintuitive search procedures and because all of *Global Explorer*'s nonmap user-interface elements are scrunched into a tiny, crowded window.

For more complex searches, you first select from 100 categories, such as City or Plaza, then enter as much of the location's name as you know. However, the relationship between categories and locations can be unclear. For example, if you choose the category City and the location Chicago, *Global Explorer* draws a blank. That's because *Global Explorer* includes a street map for Chicago, so it is listed only under the City Map category.

Adding to the confusion is the Country Locator option, which tells *Global Explorer* to search for locations only within a specified country. The crowded interface makes it easy to forget to deactivate this option when you are done with it.

Still, after you understand how *Global Explorer* works, it's simple to find obscure sites in faraway places. You can find all the hot springs in Iceland, or ruins in India.

While *Global Explorer* has no multimedia smarts, it still is an excellent demonstration of the power of CD-ROM. A paper version of *Global Explorer* would fill a bookshelf and wouldn't be nearly as fast or flexible. Nor would it be as much fun. **DAVID HASKIN**

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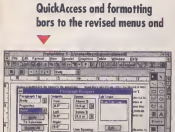
Stylizing Long Documents? FrameMaker 4.0 Is for You

INTERFACE OVERHAUL
Wow, what a difference. FrameMaker 4.0 has a new face—from the new QuickAccess and formatting bars to the revised menus and



dialog boxes (top screen). New features include CMYK, RGB, HLS, and Pantone color support; the ability to arbitrarily rotate text and graphics; and a thesaurus (bottom screen). A new context-sensitive Help system makes the program easier. Basically on online reference, Help is available for every FrameMaker function.

Frame Technology is releasing 4.0 versions simultaneously for the Sun,

Windows, and Macintosh platforms, so file-sharing across these systems should be transparent. The company also plans a 32-bit NT version.

YOU NAME THE feature, and Frame Technology has probably either improved it or added it to the latest release of its desktop publishing software, FrameMaker 4.0. The premier desktop-publishing package for long documents and multiplatform environments is now easier to use, with its advanced graphics capabilities and more than 100 new features and enhancements. Ease of use was one of Frame Technology's primary goals with this revision, and it shows.

One of FrameMaker's deficiencies until now has been its poor graphics handling. Aldus PageMaker and QuarkXpress, with their precision graphics controls and strong color support, have put FrameMaker to shame. Frame Technology, meanwhile, has wooed authors of long, technical, text-intensive documents—such as manuals and books—with FrameMaker's robust features for word processing, equation editing, cross-referencing, and index and table of contents generation.

Like Quark, however, FrameMaker 4.0 can rotate text and graphics in increments of 0.001 degree. And Version 4.0 supports CYMK, RGB, HLS, and Pantone color models and process-color separations. QuarkXpress and PageMaker still do color better, and FrameMaker still cannot wrap text around graphics without jury-rigging individual frames around an object's edges; however, Version 4.0's improvements are dramatic nonetheless.

But Frame wasn't content just to give Quark and PageMaker a run for their money. It also punched up FrameMaker's text formatting, page design, and hypertext document features. The revised Character, Paragraph, and Table Designer boxes allow you to either apply formats to selected text or update an entire style tag. Creating sidebar and run-in heads is easier in 4.0: They're now options in the Paragraph Designer Pagination box.

FrameMaker 3.0 was noted for its abilities to produce online documents with hypertext links—useful for instructional demos—and to create multiple versions of documents with its conditional-text feature. But FrameMaker 4.0 pushes the envelope even further: A new Compare Document feature generates reports, complete with hypertext links, that compare two documents and note all revisions. This is great for monitoring versions when several people edit one document. Other hypertext enhancements include automatic links in tables of contents and indexes that enable readers to jump to a specific page in the source document.

Our wish list is brief: FrameMaker should easily wrap text around graphics and create drop caps—cumbersome tasks that require anchored frames or special character formats.

A powerful program, of course, needs a powerful system—in this case, at least a 386, 8MB of RAM, and 10MB to 20MB of free disk space. Still, the $895 FrameMaker 4.0 is the desktop publishing program of choice in a demanding, text-intensive, technical publishing environment. **ANITA DENNIS**

FRAMEMAKER 4.0 • $895 • FRAME TECHNOLOGY CORP. • (408) 433-3311
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NAME YOUR TASK—FRAMEMAKER DOES IT

	FrameMaker 4.0 for Windows	QuarkXpress 3.1 for Windows	PageMaker 5.0 for Windows
Automatic lists	●	○	TOCs and indexes only
Automatic numbering of sections and tables	●	○	○
Conditional text	●	○	○
Hypertext links	●	○	○
Document comparison	●	○	○

● YES ○ NO

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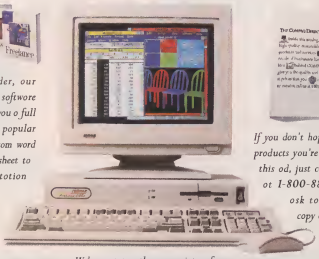

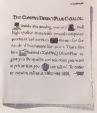

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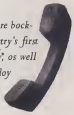

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Build Windows Apps: Realizer Does Visual Basic One Better

NOT TOO MANY years ago, if you wanted to develop a Windows application you had no choice but to struggle along in C. Now, several products bring Windows programming to the masses. Although Microsoft's Visual Basic has become the de facto standard environment for casual Windows programming, it has its competitors. CA-Realizer Version 2.0 takes a more traditional approach by using a procedure-oriented code model rather than the event-driven model used by Visual Basic. It's a definite threat to Microsoft's product.

Like Visual Basic, CA-Realizer is a complete development environment that includes a structured superset of BASIC and a visual forms designer. Both products generate EXE files, although both require that distributed programs have access to a separate runtime DLL file. CA-Realizer includes several tools that would cost the Visual Basic programmer extra money in the form of custom controls, or lots of time in the form of additional programming. For example, CA-Realizer includes a spreadsheetlike control, an animation capability, a command scheduler, and a powerful visual report writer (CA-RET). In addition, it can directly read and write Xbase files, as well as Lotus and Excel worksheet files. Visual Basic, on the other hand, is limited to simple sequential and random access to files.

You can write code to display and manipulate controls on a form, but using the visual forms developer to generate the source code is a much simpler approach. The forms developer lets you draw controls on a form, then attach "action code" to them. You can test the form as you create it, but the forms-developer mode lets you test only a single form. For example, you can't test links to other forms in your project.

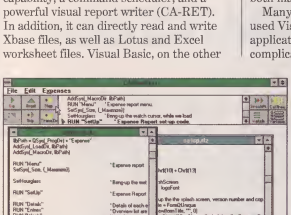
When you exit the forms-developer module, CA-Realizer generates the source code to draw the form and handle the interactions among the controls. You can examine this code and tweak it as you like. You can save forms to separate files for incorporation into other projects.

No doubt about it, CA-Realizer is a rich language, and the killer apps that ship with it prove that it can generate impressive results. Its many powerful new commands let the programmer perform actions that you'd think would require hundreds of lines of code. It's also very well documented with both manuals and online help.

Many people—especially those who have used Visual Basic—may find the entire application-development process more complicated than necessary. But it's all a matter of what you're used to. If you currently use Version 1.0, this upgrade definitely has lots to offer. The forms developer, in particular, offers many new features and is much easier to use than in the previous version. And for cross-platform development, CA-Realizer is the product of choice, because it produces code that works under Windows as well as OS/2.

All in all, Realizer is poised to give Visual Basic a serious run for its money. At $99, it's a year-end steal.

ROBIN J. WALDEN



CA-Realizer uses a superset of the BASIC language. You can write your own code or attach prebuilt action code to objects. We were able to build several apps without writing much code at all.

CA-REALIZER • $99 (UNTIL NOVEMBER 30, THEN $249) • COMPUTER ASSOCIATES INT'L • (516) 342-5224
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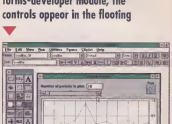
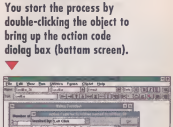
APP IN PROGRESS

Creating a form or dialog box with CA-Realizer is a click-and-drag proposition. In the forms-developer module, the controls appear in the floating



object palette (at left in top screen); after you place them, you can move and resize the controls directly.

To bring an object—such as a button—to life, you need to attach action code. You start the process by double-clicking the object to bring up the action code dialog box (bottom screen).



You can either write your own code or insert Realizer's prebuilt commands in easy print-and-shoot fashion.

dtSearch Finds Your Files on Deadline—And Under Budget

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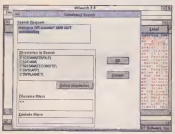
You don't need a Boolean handbook to find something with dtSearch. Even if your search is nonindexed, just fill



out the request, directories, and filter categories in the Search dialog box (top screen) and dtSearch will display an increasing number of files and hits as the search progresses. The results (bottom screen) are listed after you choose an appropriate sort method, such

as name, date, or all hits. Then double-click directly on a listed entry to open the entire document for review.

YOU'VE BEEN THERE: You need information, you need it now, and you can't find the file that contains it. It doesn't matter whether you or someone else hid the information in some cryptically named file—the result is the same. The needle's in the haystack, and you're on deadline to find it.

You need dtSearch. Unlike generic find utilities such as Norton Desktop's SuperFind, dtSearch finds files fast. And at $99, it sells for a quarter of the cost of text-retrieval giants like Isys and ZyIndex. What's more, its 384K memory requirement hides a lot of power and flexibility—including the ability to do searches with or without indexes (allowing you to optimize performance or disk space).

dtSearch covers all the bases: It searches multiple directories, indexes, and disk drives, including network drives. It does word, phrase, Boolean, wildcard, filename, and date searches. You can even do fuzzy searches and proximity searches that find any instance of a word within a given distance of another word.

Best of all, dtSearch remembers search parameters—you can reuse the last option or save up to 25 macro definitions for later use.

If you spend half your life looking for data, dtSearch is a powerful remedy. **BARRY BRENESAL**

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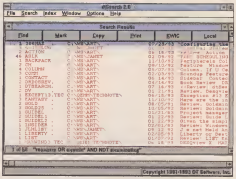


dtSearch performs searches across multiple directories, indexes, and disk drives in just about every word processing format—and it works *fast*.

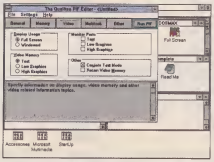
Run DOS Sessions Under Windows? 386Max Is a Direct Path to More Memory

CONFIGURING A PC's memory is a lot like customizing a sports car engine. You might end up with a machine perfectly tuned to fit the most advanced needs, or you might end up with a beautiful machine that refuses to budge. Qualitas's 386Max 7.0 is a good ally to have under the DOS/Windows hood—and it's incredibly easy to use.

386Max concentrates on Windows. Unlike Quarterdeck's QEMM-386, which makes more memory available in DOS even before you enter Windows, 386Max provides a relatively conservative memory configuration in DOS. Once inside Windows, however, you can use the DOSMAX utility to optimize memory for text-based programs running under DOS. In our lab tests we saved from 60K to 130K.

DOSMAX instantly notifies you if a text program tries to switch to graphics mode; you can terminate the DOS window or ignore the mode switch.

386Max offers disk compression and works with MS-DOS 6.0's MultiConfig. If you run DOS sessions under Windows, there's no easier way to free up memory. **BARRY BRENESAL**



Qualitas's 386Max 7.0 includes a more clear replacement for Windows' PIF Editor.

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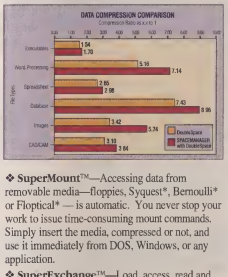
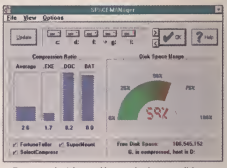


❖ **SuperMount**™—Accessing data from removable media—floppies, Syquest*, Bernoulli* or Floptical* — is automatic. You never stop your work to issue time-consuming mount commands. Simply insert the media, compressed or not, and use it immediately from DOS, Windows, or any application.

❖ **SuperExchange**™—Load, access, read and write DoubleSpace data on any system running DOS 3.3 or later. Any files saved to your compressed floppy and removable disks—even by someone who doesn't have MS-DOS® 6—are automatically compressed.



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Microsoft Compatibility Laboratory 100% MRCL COMPATIBLE 1993

Look what they're saying about SpaceManager!

"SpaceManager operates seamlessly with DoubleSpace." *InfoWorld, July 12, 1993*

"Data Compression help...SpaceManager augments DoubleSpace." *Byte, July 1993*

"SpaceManager, a product providing the viewing capabilities, downward MS-DOS compatibility and removable media support missing from DoubleSpace." *Computer Sources, July 1993*

"SpaceManager offers higher compression ratios and the ability to share compressed data with everyone via floppies— whether or not the other people use DoubleSpace." *DOS Resource Guide, Sept. 1993*

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System Requirements

- 286, 386, 486 or Pentium* IBM* PC compatible.
- Hard disk with 640KB of memory available (2MB of extended memory suggested).
- MS-DOS® 6 with DoubleSpace installed.
- SelectCompress and SuperCompress require at least 2MB of extended memory.

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VERTISOFT SYSTEMS, INC.

The company that licensed the data compression technology to Microsoft for inclusion in MS-DOS® 6 DoubleSpace.

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Effects for Windows: The Quick And Dirty Way to Make Text Sing

THE ABCs OF EFFECTS
Bored with the same old fonts? Effects Specialist for Windows spirals, skews, inverts, and otherwise tweaks text using PostScript and TrueType fonts.

NOBODY NEEDS SPIRALING, swirling, skewed text for everyday correspondence and paper-shuffling. But for eye-popping presentations that'll hook a megamillion-dollar client, text effects impress. Effects Specialist for Windows, a new program from Postcraft International, offers nuts-and-bolts text styling for a reasonable $199.95.

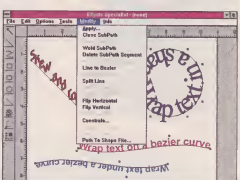
Effects Specialist lets you wrap text along lines, curves, and shapes, plus it gives you some control over effects, fills, and strokes. The program is straightforward: Draw a line, Bézier curve, or shape using the appropriate tool, and apply a text effect. Choose a headline or drop-shadow effect; pick a fill such as solid, radial, or linear; and select one of six effects.

The program supports PostScript Level 1 and TrueType fonts and saves creations in BMP and EPS formats. It supports 24-bit color and offers CYMK, RGB, and Focaltone color models.

But as a relatively low-end graphics program, Effects Specialist has its share of drawbacks. Although you can zoom from 1 to 1,500 percent, there's no grabber hand, you can't drag rules from the ruler to help align paths, and the toolbar is in a fixed position. If you only need to whip out quick-and-dirty text effects for newsletters, slides, posters, or brochures, Effects Specialist does the job. But higher-end programs like Pixar's Typestry (see New! May, page 66) do it with greater panache.

ANITA DENNIS

Using simple sliders (top screen), you can dramatically change the attributes of text elements. You can also use sliders to alter the colors you apply to your text effects (bottom screen). Watch out though: This can get addictive.



Want to spice up your brochure by flowing text along a Bézier curve? It's easy in Effects Specialist.

EFFECTS SPECIALIST FOR WINDOWS • $199.95 • POSTCRAFT INTERNATIONAL • (805) 257-1797
Circle No. 620 on Reader Service Card

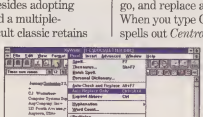
XyWrite for Windows: Loyal Fans of the DOS Version Will Feel Right at Home

XYWRITE'S DWINDLING BUT loyal band of aficionados can rejoice: The Technology Group has finally brought out a version of XyWrite for Windows. Besides adopting Windows' conventions and a multiple-document interface, this cult classic retains its distinctive command line—which uses short commands for fast file management and allows editing of file attributes from within the app.

XyWrite is loaded with convenience features: You can transpose letters, words, sentences, and paragraphs with the click of a button—handy if you habitually revise text. You can toggle through case selections (EDIT, Edit, edit), redline, automatically spell-check as you go, and replace acronyms with their full text. When you type CIA, for example, XyWrite spells out *Central Intelligence Agency*.

If you're happy with one of the big-three Windows word processors, you won't want to switch. But for tried-and-true XyWrite fans, the Windows version will feel like home sweet home.

ANITA DENNIS



XyWrite for Windows has redlining and an auto-replace function that spells out acronyms.

XYWRITE FOR WINDOWS 1.0 • $495 • THE TECHNOLOGY GROUP • (410) 576-2040
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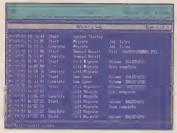
The Ultimate Kit for

FILE SHUFFLE

Once disk capacity crosses on administrator-defined threshold (below), HSM takes over and begins to migrate files onto secondary storage devices. The manager server first copies the selected files to a local volume, designated Migrate1. At the same time, these files are mirrored to a second local volume called Shadow1. These volumes, along with Migrate2 and 3 and Shadow2 and 3, are located on the hard drives on the manager server. Once



those copies have been made and verified, Shadow1 dumps to the tape-backup unit. Only when this process has been completed does the system go back and delete the files taken from the original volume, leaving a 420-byte flag in place of each one.

IF KEEPING YOUR network humming means constantly battling NetWare's "Disk Full" message by purging disks, volumes, and file systems of outdated or unused material, then Conner Peripherals Storage Systems Group has the solution for you. Borrowing a page from mainframe history, Conner recently released its Hierarchical Storage Management (HSM) system, a combined software and hardware package that manages all storage on a Novell network.

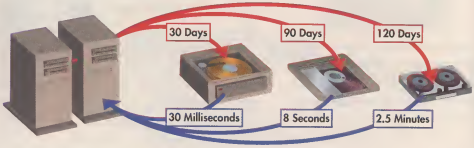
As the name implies, HSM provides a cascaded system of storage devices that migrates data from expensive hard disks to alternate media. The product is targeted at larger network installations, where total storage runs into the tens or even hundreds of gigabytes; in fact, the system we installed and tested requires a dedicated server to manage the storage options.

The full HSM installation consists of software, a storage-management server with a pair of 300MB or larger mirrored disk drives installed, a magneto-optical disk jukebox, and a tape-backup system. HSM is an "open" product, meaning the hardware (server, disks, magneto-optical jukebox, or tape) you use with the management modules doesn't have to be from Conner Peripherals. At this time, 100 percent compatibility has been certified with only a limited number of major vendors, but Conner plans to certify other systems based on customer demand.

The software consists of an installation package and several NetWare Loadable Modules (NLMs). Considering the complexity of the system, it's relatively easy to install—figure on spending at least two hours setting up the server and volumes. Once we completed the installation, configuration was a snap. Essentially, each managed volume is given three working levels of capacity—Critical, Acceptable, and Optimal—that are determined by the percentage of data being backed up. There is no limit to the number of managed volumes a system may have, and the capacity parameters are set individually for each. There is also a default system setting for networks that have large numbers of volumes of an identical or similar type, for which parameters would all be the same. Volumes and directories may also be excluded from management, as would normally be the case with the System, Public, Mail, and Login directories.

THE HSM SYSTEM: COMPLETE STORAGE

With data storage, timing is everything.



The Conner system moves inactive data off expensive hard drives and onto alternate media based on the age of the files. Recovery time is determined by the storage device.

Network Storage

Once volume parameters are set, HSM goes into action. Not that you'd notice: HSM is designed to migrate files transparently based on the network administrator's criteria—primarily the last date that the file was accessed. When a managed volume exceeds the Critical capacity point, HSM steps in and begins to transfer files to your selected device, either a magneto-optical drive or a tape jukebox (see "File Shuffle" at left). When the user asks for a file that has been migrated, the only clue to where the file is stored is the amount of time it takes to access it. Magneto-optical systems may take up to 10 seconds to deliver a file, while a tape search could take a minute or two. For files that tend to be accessed periodically—such as quarterly reports or tax data—HSM features a utility called Recall, which lets the administrator bring any collection of files or directories back into primary storage before users actually need them.

Keep in mind that HSM is a storage-management solution, and not another backup system. In fact, HSM is designed to coexist with most NetWare-compatible backup software, only migrating data that has already been backed up. One caveat: You will have to shut down HSM before running a primary backup on any managed network file server or HSM server. HSM also offers a second layer of data protection by automatically backing up inactive files before sending them to secondary storage (see "Keeping Track" at right). In case of secondary storage failure, HSM comes with utilities that let you restore data either directly to the primary file server or to the secondary storage unit.

The basic HSM software costs $7,500, with modules for three additional managed servers available at $3,000 apiece. Hardware costs vary according to which setup you implement, the size of the buffer disks used, whether you use the magneto-optical system or tape library or both, and a number of other configuration factors. For 70GB of network storage, Conner estimates the cost of HSM at $46,000, compared to $161,000 for equivalent disk space. And you'll save more than money: By eliminating at least some routine management tasks, HSM also saves network managers their most precious resource—time.

JOHN BRYAN

HIERARCHICAL STORAGE MANAGEMENT • CONNER PERIPHERALS STORAGE SYSTEMS GROUP • (407) 263-3500
Circle No. 622 on Reader Service Card

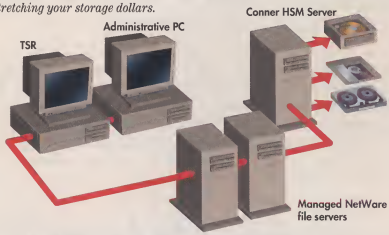
Keeping Track

One of the key advantages of HSM is that its operation is completely transparent to the user. In fact, even the administrator can forget about the system once it's set up. Of course, HSM includes a fairly extensive array of reporting capabilities, allowing the network administrator to maintain precise information about file location, system performance, efficiency, accuracy, and several other aspects. While HSM is extremely robust at the server

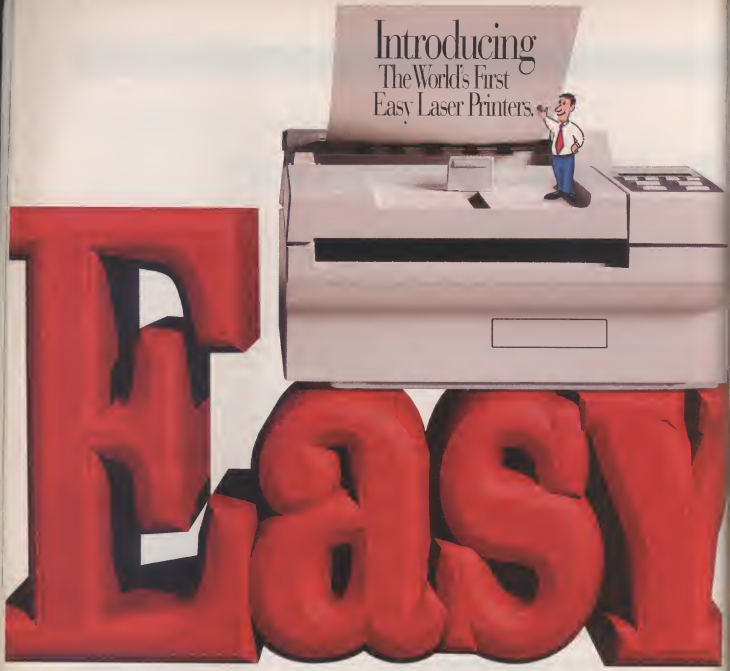
and volume levels, errors can occur. If the system is disrupted, it will broadcast a warning to the administrator, who can track down the problem via detailed reports and activity logs.

HSM NETWORK CONFIGURATION

Stretching your storage dollars.



Each HSM server can effectively manage about 10GB of data and support two network file servers. Optional modules are available for additional servers.



Here's some really big news for the little guy. Introducing the world's first EASY laser printer. The Citizen ProLaser 6000.™

The Citizen ProLaser 6000 is the only laser printer you can get with the features you want, and the "easy" you need. Just like the big-guys, we have a list of impressive features (you techies can check it out below). But what's really important is that it's easy to buy because everything's included. It's easy to use because you just plug it in and it works. And it's easy to look your best with lots of internal fonts and print quality that'll make you OOH and AAH.

So why do we put so much in a laser printer that costs so little? Hey, we're Citizen. We've been making dot-matrix printers that way for years. And besides, someone's got to look out for the little guy.

TECHIE SPEC BOX

The Citizen ProLaser 6000's features include a single component imaging cartridge, HP LaserJet III (PCL-5) compatibility, a reliable internal paper tray, 34 internal fonts, 6 FPM output, a 32-bit RISC processor and much more. Pretty good, huh?

CITIZEN
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Spotlight

Thanks for the Memory

So now that memory management is free in DOS 6.0, you don't have to think about it, right? That's true, unless you're interested in another 100K or more of free space for those fat games and bulky graphics programs.

Memory Commander 4.0 frees up and dynamically manages certain high memory areas that are normally reserved, and it loads network drivers, TSRs, and device drivers high without changing CONFIG.SYS and AUTOEXEC.BAT files. You can gain 7K to 15K under Windows, and as much as 150K for DOS programs. If your configuration changes, Memory Commander will remind you to re-optimize memory. ($100, or $30 for upgrades; V Communications; 800-648-8266, 408-296-4224)
Circle Reader Service No. 634

QEMM Version 7.0 takes advantage of reserved video memory to give you access to as much as 736K of conventional memory for DOS-based (not Windows) programs. It also can tuck DoubleSpace, Microsoft's disk doubler, into expanded memory to save about 40K. And it loads a few more kilobytes of DOS 6.0 high, and as much as 70K for machines with earlier versions. ($100, or $5 for upgrades; Quarterdeck Office Systems; 310-392-9851)
Circle Reader Service No. 635

Netroom 3.02's new features relate mostly to network memory enhancement. Version 3.0 already swapped the BIOS for one that frees up at least another 100K more of conventional memory than MemMaker does. Version 3.02 moves the often-memory-hungry device drivers and TSRs for networks such as NetWare, VINES, and LANtastic out of conventional memory. It can be remotely installed across a network and will automatically detect the addition of network adapters and warn you to reconfigure. ($99 for single-user license; Helix Software; 800-451-0551)
Circle Reader Service No. 636

THE LATEST UPGRADES TO PRODUCTS YOU USE.

BY MIKE HOGAN

Sound Blaster Digital Edge CD

Creative Labs goes the new Multimedia PC Level 2 standard a couple better. With a 350-millisecond access rate in its dual-speed, multisession 680MB CD-ROM—and a digital signal processing–based hardware compression/decompression methodology in its Sound Blaster 16 audio board/CD-ROM controller—you can take more of the processing load off your CPU. Accompanying software lets you give voice commands to Windows apps and have the board read files back to you. You also get speakers, a microphone, and a big bundle of other productivity and multimedia software. Despite its $999 list price, you can find it for less than $600 at the street price. ($999; Creative Labs; 800-998-5227)
Circle No. 624 on Reader Service Card

WordPerfect Presentations 2.0 For Windows

It's not just for WordPerfect word processing users. Anyone can use this high-end desktop presentation program, even those who want to incorporate charts and graphics created in the advanced object linking and embedding (OLE) server in other Windows applications. Version 2.0 has a split-screen chart editor that lets you edit a chart in one window and see changes in its data sheet in another window. Also included are advanced drawing tools such as bitmap editors and auto-trace to turn bitmaps into vector images or special effects. ($199, or $495 with Logitech's handheld ScanMan Model 32; WordPerfect; 800-451-5151)
Circle Reader Service No. 625

Flightstick Pro
This quick-throttle joystick is the other dimension of the Microsoft Flight Simulator experience (see page 106). Compatible with the new Version 5.0, Flightstick Pro lets you control flaps, gears, brakes, and trim controls for fine-tuning your aileron and elevator positions. A four-way viewing switch lets you scan the horizon in every direction. ($99; CH Products; 619-598-2518)
Circle No. 623 on Reader Service Card

Microsoft Mail Special Edition for PC Networks 3.2

How many hours do you waste on e-mail? A trio of third-party products bundled in a special edition of Microsoft Mail can save you time. WinRules lets you assign mail filters and folders by sender, date, and other criteria so that your important memos will never again get lost amid notices of baby showers, birthdays, and non-mission-critical office chatter. Absentee Manager lets you track the mail that you had forwarded to others while you were out of the office; Outside In lets you view binary files in 120 different formats whether or not you have loaded the applications that created them. Normally, ten-user licenses of WinRules, Absentee Manager, and Outside In would total more than $2,000, but you can get them in this special edition for only $300 more than Mail's normal $695 sticker. ($995; Microsoft; 206-882-8080)
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CompressMate

Like to create really big spreadsheets? The trouble is, they can eat more disk space than graphics files (which they often contain). CompressMate compresses Lotus, Excel, Quattro Pro, and other spreadsheets by an average of 10 to 1, and at a rate of up to

(Continued on page 107)

Introducing AMBRA. A new kind of standard doesn't equal average. *Speed* 66 MHz performance at 33 MHz prices.

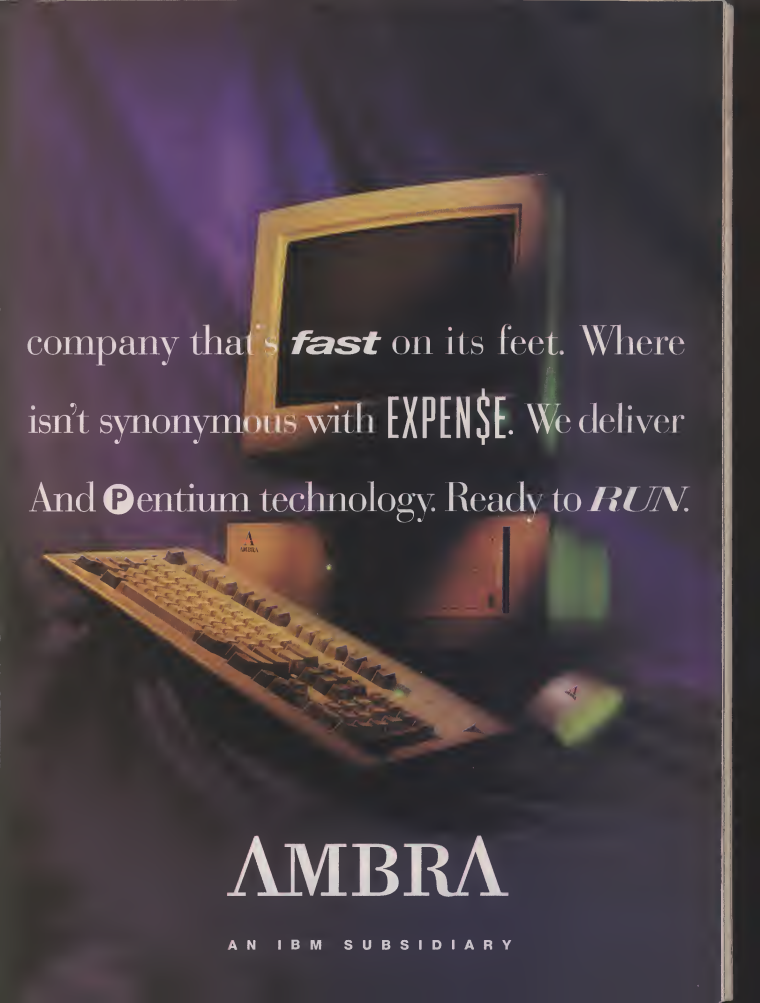
AMBRA: Ready when you are. If you're like many sophisticated PC users, you're ready for the latest and leading technology. Not later, but right now. At the right price.

AMBRA,™ a new IBM subsidiary, is ready to do business with you.

To begin, we source worldwide, getting the best late-breaking technology from high-quality suppliers, including IBM,® Intel,® Microsoft,® and more. We buy smart and bargain aggressively, keeping our operations streamlined and our overhead low. And when you buy direct from us — whether it's a single standalone system or a server powered by dual Pentium™ processors — we pass our savings directly along to you.

But we know you're looking for much more than low price. That's why we run our computers through comprehensive testing to ensure industry-standard compatibility. It's why we've contracted with IBM to back AMBRA systems with the best in service and support. It's why we custom-configure to order — at no extra cost. And deliver to your door without delay.

Interested? We invite you to keep reading, then give us a call. We're ready to send you complete details on AMBRA computers and the services we offer, including our 30-day money-back guarantee.[1,2]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Combining industry-wide resources with independent responsiveness, AMBRA provides you with *immediate* access to the latest technology.

If it's industry-standard, we've got it for you now. If it's coming soon, we're positioned to get it — from advanced video to the latest microprocessors.

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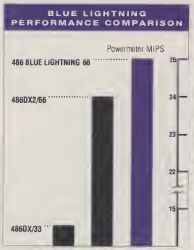
IBM's 486 Blue Lightning™ processor builds on the best features of Intel microprocessors, including performance, instruction set and upgradeability. IBM optimized the instruction set, added a 16KB internal cache, lowered power consumption and improved power management. The result: Blue Lightning doubles internal clocking to 66 MHz, while maintaining full 486 compatibility. AMBRA harnesses the power of Blue Lightning to deliver 66 MHz system performance at 33 MHz prices.



All processors were tested on the same IBM motherboard
MIPS = millions of instructions per second

Built to your order, exactly.
AMBRA will custom-configure any and every computer for you — and it won't cost you an extra day or an extra dime! You have your choice of chassis, processors and a full range of memory sizes. Hard and floppy disks, tape drives, CD-ROM drives, multimedia kits, and more. Plus high-quality, low-radiation AMBRA monitors, network cards, you name it. You get it all preinstalled, from a single source.

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66 MHz performance at 33 MHz prices.

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	AMBRA	GATEWAY	DELL
Model	486 Blue Lightning 66	486DX-33V	433/L
Internal clock	**66 MHz**	33 MHz	33 MHz
External clock	33 MHz	33 MHz	33 MHz
System case	Desktop	Desktop	Desktop
RAM	8MB	8MB	8MB
Cache	**256KB**	128KB	—
Floppy	One	One	One
Hard disk	340MB	340MB	340MB
Onboard SCSI	✔	—	—
Local bus	✔VESA	✔VESA	✔
Video	Win accel w/1MB	Win accel w/1MB	Win accel w/512KB
Color monitor	15" FST*	15" FST	15" FST
Pentium-ready	✔	✔	✔
DOS 6.0, Windows 3.1, mouse	✔	✔MS Works for Windows	✔
Network-ready	**Ethernet (10BaseT)**	—	—
Tech support	24 hours, 7 days/week	Mon–Fri, 6 am to midnight Sat, 8am–4pm	24 hours, 7 days/week
Warranty/Service	1 year onsite	1 year onsite	1 year onsite
Price	**$2,079**	$2,025	$2,699

*Upgraded from 14" SVGA at no extra cost. See special offer

Intel Pentium processing, within your reach.

AMBRA is one of the few who can offer you Pentium technology today — and we offer it at a price you can afford.

	AMBRA	DELL
Processor	Intel Pentium 60 MHz 64-bit proc complex	Intel Pentium 60 MHz 64-bit proc complex
Bus type	EISA	EISA
System case	Desktop	Tower
RAM	8MB	8MB
Cache	256KB	256KB
Floppy	One	Two
Hard disk	**540MB SCSI**	500MB IDE
Onboard SCSI	✔**Dual 32-bit**	—
Local bus	✔VESA	✔
Video	**ATI™ Ultra Pro w/2MB DRAM**	Win accel w/512KB
Color monitor	15" FST*	15" FST
DOS 6.0, Windows 3.1, mouse	✔	✔
Tech support	24 hours, 7 days/week	24 hours 7 days/week
Warranty/Service	1 year onsite	1 year onsite
Price	**$4,259**	$7,566

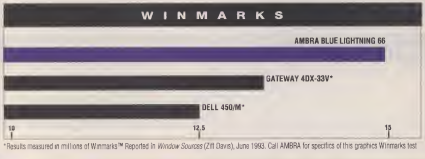
*Upgraded from 14" SVGA at no extra cost. See special offer

Solid products, hot prices.

Competitive prices shouldn't mean mediocre machines. Example: AMBRA's low-cost Model S425SX. It puts you in touch with tomorrow's innovations. That's because it's Pentium-ready — and supports memory upgrades to 36MB. It features the upgradeable 486SX 25 MHz processor, cache to spare, a fast local bus, and Windows accelerator with 1MB video memory.

Extra compact design. Extra color.

At 6.4 pounds, our 486SX 25 MHz SL-Enhanced notebook packs a lot of performance. You get 4 MB of expandable memory; a 120MB hard disk; STN dual-scan, passive-matrix screen for vibrant color and easy mouse tracking; plus integrated fax/modem and built-in trackball. All for $2,449.



*Results measured in millions of Winmarks™ Reported in *Window Sources* (Ziff Davis), June 1993. Call AMBRA for specifics of this graphics Winmarks test

AMBRA custom-building lets you cover all the bases.

HERE ARE JUST A FEW MODELS WE'LL MOLD TO MEET YOUR NEEDS:

Model S450SL
- 486SLC2, 50 MHz
- 4MB RAM max: 16MB
- 64KB processor cache
- 3.5" floppy
- 120MB (19ms) hard disk
- Windows accelerator with 1MB video memory
- Slimline case
- 3 16-bit ISA slots
- MS-DOS 6.0, Windows, mouse

$989
(Monitors start at $200)

Model S425SX
- 486SX, 25 MHz
- Pentium technology ready
- 4MB RAM max: 36MB
- 128KB processor cache
- 3.5" floppy
- 170MB (17ms) hard disk
- 2 VESA local bus slots
- Windows accelerator with 1MB video memory
- 14" SVGA LR color monitor
- Slimline case
- 3 16-bit ISA slots
- MS-DOS 6.0, Windows, mouse

$1,339

Model S433DX
- 486DX, 33 MHz
- Pentium technology ready
- 4MB RAM max: 36MB
- 128KB processor cache
- 3.5" floppy
- 240MB (15ms) hard disk
- 2 VESA local bus slots
- Windows accelerator with 1MB video memory
- 14" SVGA LR color monitor
- Slimline case
- 3 16-bit ISA slots
- MS-DOS 6.0, Windows, mouse

$1,689

NC425 SL Notebook
- 486SX, 25 MHz, SL-Enhanced
- Dual-scan STN color screen (640 x 480 x 256)
- Fax-modem 2400/9600 baud
- 4MB RAM max: 12MB
- 120MB hard disk
- 3.5" floppy
- 9.5" screen
- Integrated trackball
- 8.6" x 11.4" x 2.0", 6.4 lbs
- MS-DOS 6.0, Windows, MS Works for Windows

$2,449

Model D466BL/CD
An AMBRA Best Buy!
- 486 Blue Lightning 66 MHz
- Pentium technology ready
- 8MB RAM max: 64MB
- 256KB processor cache
- 3.5" floppy
- 440MB (12ms) hard disk
- Onboard SCSI
- 2 VESA local bus slots
- Windows accelerator with 1MB video memory
- CD-ROM drive and software
- Media Vision 16-bit sound card
- Stereo speakers
- 17" Flat Square LR color monitor, NI
- Network-ready (Ethernet 10BaseT)
- Desktop case
- 5 16-bit ISA slots
- MS-DOS 6.0, Windows, mouse

$2,869
(For minitower, add $50)

Model D466BL
- 486 Blue Lightning 66 MHz
- Pentium technology ready
- 8MB RAM max: 64MB
- 256KB processor cache
- 3.5" floppy
- 240MB (15ms) hard disk
- Onboard SCSI
- 2 VESA local bus slots
- Windows accelerator with 1MB video memory
- ★ 15" Flat Square LR color monitor, NI
- Network-ready (Ethernet 10BaseT)
- Desktop case
- 5 16-bit ISA slots
- MS-DOS 6.0, Windows, mouse

$1,979
(For minitower, add $50)

Model D466DX
- 486DX2, 66 MHz
- Pentium technology ready
- 8MB RAM max: 64MB
- 256KB processor cache
- 3.5" floppy
- 340MB (12ms) hard disk
- Onboard SCSI
- 2 VESA local bus slots
- Windows accelerator with 1MB video memory
- CD-ROM drive
- ★ 15" Flat Square LR color monitor, NI
- Network-ready (Ethernet 10BaseT)
- Desktop case
- 5 16-bit ISA slots
- MS-DOS 6.0, Windows, mouse

$2,599
(For minitower, add $50)

Model D466E/VL
- 486DX2, 66 MHz
- Upgradeable to 64-bit Pentium technology
- 8MB RAM max: 64MB
- 256KB processor cache
- 3.5" floppy
- 440MB (12ms) hard disk
- 2 VESA local bus slots
- S3 video accelerator with 1MB DRAM
- ★ 15" Flat Square LR color monitor, NI
- Desktop case
- 7 32-bit available EISA slots
- MS-DOS 6.0, Windows, mouse

$2,699

intel inside

Model DP60E/VL
A Pentium Powerhouse!
- Intel Pentium processor, 60 MHz
- 64-bit processor complex
- VESA local bus with 1 available slot
- 8MB RAM max: 64MB
- 256KB processor cache
- 3.5" floppy
- 540MB SCSI hard disk
- Onboard dual 32-bit Fast SCSI
- ATI Ultra Pro Mach 32, 2MB DRAM
- ★ 15" Flat Square LR color monitor, NI
- Desktop case
- 7 available 32-bit EISA slots
- MS-DOS 6.0, Windows, mouse

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In Canada,[3] call 1-800-363-0066, Ext. 853

CALL 1-800-252-6272, EXT. 280

1-800-252 AMBRA

Short Takes

Central Point Anti-Virus 2.0 provides added protection against unknown viruses by using expert system technology that detects viruses by both identifying generic characteristics and using a proprietary checksum engine that detects legitimate, not viral, file changes. Anti-Virus also defends against the 2,000 known viruses that already afflict us. ($130, or $30 for upgrades; Central Point Software; 800-964-6896)
Circle Reader Service No. 637

Pacific Data Products ProTracer II/GL's tweaks make big CAD plots, drawings, and oversized spreadsheets print faster and cleaner. Included are new, faster versions of HPGL and HPGL 2, improved print speed, and a better method for centering and fitting drawings on different-size paper. ($2,149; Pacific Data Products; 619-552-0880)
Circle Reader Service No. 638

ATI Technologies graphics board owners can upgrade to newer and more capable versions of ATI graphics adapters for roughly the price difference between the two boards. Current higher-order adapters affected include the Graphics Ultra and Graphics Ultra Pro models for both ISA and EISA buses. (Various prices; ATI Technologies; 416-445-9774)
Circle Reader Service No. 639

Terminal Plus with Faxit lets you fax your representatives in Congress in a flash with the automated Congressional phone book that FutureSoft has added to its Terminal Plus with Faxit data communications/fax program. The Congressional Directory supplement includes the fax numbers of all House and Senate members, an integrated text editor, and addressing and fax-management features. ($195, or $69 for upgrades; FutureSoft Engineering; 713-496-9400)
Circle Reader Service No. 632

CompressMate, *from page 101*

100 to 1 in certain types of formula-heavy spreadsheets. It also works fine in conjunction with DOS 6.0's DoubleSpace and other disk compressors. ($79 for each spreadsheet file type selected; Intex Solutions; 617-449-6222)
Circle No. 627 on Reader Service Card

LandDesigner 3.0

There's a good chance that, when you're not thinking of PCs, you're thinking of basil and carrots, Rainbird Impulse head coverage, and drought-resistant perennials. Researchers say that gardening and PCs have a lot in common—namely you. More than 77 million baby boomers shake their spreadsheet blues by pulling weeds, but there's no reason that the PC can't help. LandDesigner 3.0 applies low-end CAD to the job of laying out that garden plot, redwood deck, or water-coverage pattern, or picking the right shade-loving ground cover. It's augmented by a huge plant database, useful gardening and landscaping supply lists, and cost-estimation worksheets. Go ahead, get your hands dirty. ($89; Green Thumb Software; 800-336-3127)
Circle No. 628 on Reader Service Card

Alpha Four 3.0

Nothing makes your head hurt worse than database design. But ease of use is what made Alpha Four a longtime best-seller. With Version 3.0 of this menu-driven relational database manager, it's easier to make one-to-many data links, update multiple files, and perform sequential data lookups using conditional statements. ($495; Alpha Software Corp.; 617-229-2924)
Circle No. 630 on Reader Service Card

Microsoft Flight Simulator 5.0

You junior birdmen (and women) who have been up and away with wire-frame versions of Microsoft Flight Simulator for years can now get more robust color and scenery details, including bad weather sound effects, when you crash into other planes and fuel trucks. You can even buzz the Eiffel Tower on the New York-to-Paris run thanks to two scenery-enhancement packages sold separately for $39.95 each. Isn't it time you earned that propeller for your beanie? ($64.95; Microsoft; 206-882-8080)
Circle No. 629 on Reader Service Card

Norton Commander 4.0

One of the best ways to get around in DOS or MCI Mail is to use Norton Commander. Version 4.0 of this mouse-enabled shell adds more-straightforward file management, including the abilities to perform copy, move, and delete functions on entire directory trees and to display the last 15 DOS commands used. There's parallel-port support, so transferring files between desktops and portables is faster than with serial-port transfers. And not only does Commander offer a great MCI Mail front-end but you can now view more than 50 file types, even compressed files, without loading the apps that created them. ($99, or $39 for upgrades; Symantec Corp.; 800-441-7234, 408-252-3570)
Circle No. 631 on Reader Service Card

Org Plus for Windows 2.0

Making organization charts isn't like other types of charting or drawing. The complex interrelationships have a way of rearranging themselves overnight (or even more often at some companies). Version 2.0 of Org Plus makes it easier than ever to keep up with changes established by your organization's management—you can use OLE to create org charts within other Windows applications. The new version also lets you import a wider array of other graphics and text files. You even can add photos of your fellow workers on the corporate ladder. ($199, or $49 for upgrades; Banner Blue; 510-795-4490)
Circle No. 633 on Reader Service Card

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to tell about it. But hey,
our data will.

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Circle 144 on reader service card.

New!

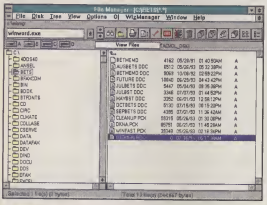
BEST BETS

BY PRESTON GRALLA

PCContact

Power Up Windows File Manager With Shareware

Windows File Manager is no one's favorite utility. Yes, it does the job, but without grace or ease. And it could benefit from a little juicing up as well. There's a shareware solution at hand: WizManager. This great add-in makes File Manager easier to use and more powerful as well. It adds a configurable button bar so that all of File Manager's functions—copying and deleting files, creating directories, changing sort orders, and more—are within easy reach. It also gives you a command line so you can launch Windows and DOS programs and execute DOS commands. If you get tired of Windows's slow and clunky behavior when you're managing files, the command line will be a big relief. The command line even allows for WizManager-specific commands. Try out WizManager free by downloading WIZMGR.ZIP from data library 3 (Utilities, Misc.) of PC/Contact, *PC/Computing*'s online forum.



It's also available for $39.95 from its author, Mijenix, at 6666 Odana Rd., Suite 326, Madison, WI 53719.

Circle Reader Service No. 640

BEST SOFTWARE BUYS

Where can you get the best software deal? Usually through the mail. We surveyed mail-order houses and came up with the best prices we could find. The following prices include shipping and handling charges but not credit-card surcharges. Prices are as of press time and are subject to change.

PRODUCT	LIST PRICE	BEST PRICE	SOURCE	READER SERVICE NO.
DOS 6.0 upgrade	$129.00	$49.95	Microwarehouse, (800) 367-7080	644
Excel 4.0	$495.00	$299.00	Software Add-Ons, (800) 695-8088; or Lomo, (800) 369-2846	645
Lotus 1-2-3 3.4	$495.00	$304.98	PC Zone, (800) 252-0386	646
Microsoft Word 6.0	$495.00	$319.95	Microwarehouse, (800) 367-7080	647
Norton Utilities 7.0	$179.00	$105.00	Software Add-Ons, (800) 695-8088	648
QEMM-386	$100.00	$62.00	Software Add-Ons, (800) 695-8088; or Computability, (800) 558-0003	649
Quattro Pro 4.0	$495.00	$99.00	Lomo, (800) 369-2846	650
Windows 3.1	$149.00	$92.00	Compuclassics, (800) 827-1994; or Computer Discount Warehouse, (800) 473-4239	651
Word for Windows 2.0	$495.00	$298.00	Software Add-Ons, (800) 695-8088; or Lomo, (800) 369-2846	652
WordPerfect 6.0	$495.00	$288.00	Computer Discount Warehouse, (800) 473-4239	653
WordPerfect for Windows 5.2	$495.00	$244.99	ET Valueline, (800) 395-1000	654

Microsoft Office Includes Access

Microsoft Office has long been a popular suite, and now the deal is better. The Microsoft Office with Microsoft Access edition has Version 1.1 of the database, the spreadsheet Excel 4.0, the presentation graphics program PowerPoint 3.0, Word, and a license for Version 3.2 of the e-mail package Mail. The suggested price for the bundle is $949, but you'll find it for less if you shop around. The original Office, which includes everything except Microsoft Access, still carries a list price of $750. Contact Microsoft at (800) 426-9400.

Circle No. 641 on Reader Service Card

Donate Your Old Hardware—and Get A Tax Deduction

What to do with that old PC, printer, modem, or other piece of hardware lying around the office? Don't junk it—do a good deed, and get a tax deduction in the process. Donate your old equipment to the East West Education Development Foundation, which will in turn distribute it to schools, colleges, and democratic and educational institutions around the world. You'll get the satisfaction of having done the right thing and a tax deduction as well. Call East West at (617) 542-1234 for more details.

Circle No. 642 on Reader Service Card

Color Hand Scanner, Plus OCR, Imaging Software—for $300

If you've wanted a color scanner but thought it was beyond your budget, think again. Envisions has a remarkable deal: For $299 you get not only the Envcolor color hand scanner but also Perceive Personal OCR software and Halo Desktop Imager scanning software. Halo includes an autostitch feature that joins two portions of a scan. For information, call Envisions at (800) 356-7226.

Circle No. 643 on Reader Service Card

Cash in on OmniPage.

$200 Rebate

For a limited time, OmniPage® Professional, the business professional's choice in OCR, comes with a $200 rebate. And if that isn't enough, you'll also receive a free copy of Image Assistant™, Caere's Image editing software.

$100 Rebate

Thinking about buying a scanner? A hundred dollars back on OmniPage® should make the decision an easier one. And a smarter one too. Because not only is OmniPage easy-to-use, it handles just about any layout, font, or text element.

$295 SRP

Now OmniPage® Direct is an unbeatable value, no matter when you purchase it. Direct adds the world's most accurate text recognition directly to your working applications.

There's never been a better time to upgrade your scanner. Because when you buy OmniPage Professional or OmniPage between August 1, 1993 and October 15, 1993, not only will you get the most accurate, easy-to-use OCR available, you'll also get something more. Cash back direct from Caere. And when you purchase OmniPage Direct, you'll be rewarded with a new suggested retail price. So stake your claim now. For more rebate or product information, call **1-800-535-SCAN**.

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Circle 261 on reader service card.

Software Saleswire

DOS, Windows, and OS/2 slug it out at the cash register.

King Again
The first upgrade to WordPerfect since 1989 propels this DOS app to No. 1 in a category crowded with Windows software.

Going Graphical
Inset Systems has radically improved its image editor's performance and interface to compete in a tight graphics software market.

Job Wanted?
Quick & Easy, which returns to the Top 10 after a one-month hiatus, is the fastest way to convos the federal job market.

BUSINESS APPLICATIONS	VENDOR	PRICE	COMMENTS	JUL	AUG
WordPerfect 6.0	WordPerfect	$495	As close to a GUI as a DOS app gets.	-	1
Lotus 1-2-3 4.0 for Windows	Lotus	$495	An old standby loaded with new tricks.	8	2
Excel 4.0 for Windows	Microsoft	$495	Presentation tools include 3-D charting.	4	3
Access 1.1 for Windows	Microsoft	$495	Reads, writes many database formats.	10	4
Office 3.0 for Windows	Microsoft	$750	Includes powerhouses Word and Excel.	1	5
WordPerfect 5.2 for Windows	WordPerfect	$495	Send files as e-mail from the program.	2	6
Procomm Plus 2.01	Datastorm	$129	Enhanced dialing directory also sorts.	-	7
Lotus 1-2-3 3.4	Lotus	$595	One word says it all: *faster*.	9	8
WinFax Pro 3.0	Delrina Tech.	$129	Receive faxes at your desktop.	-	9
CorelDraw 3.0 for Windows	Corel Corp.	$199	Older version outsells higher-end 4.0.	-	10

UTILITIES	VENDOR	PRICE	COMMENTS	JUL	AUG
MS-DOS 6.0	Microsoft	$129	Interlink eases file transfers between PCs.	1	1
Windows 3.1	Microsoft	$149	A 16-bit graphical OS for your PC.	2	2
OS/2 2.1	IBM	$249	The 32-bit OS will battle Windows NT.	-	3
QEMM-386 7.0	Quarterdeck	$100	Popular memory manager is updated.	4	4
After Dark 2.0 for Windows	Berkeley Systems	$50	New version adds multimedia.	3	5
Norton Utilities 7.0	Symantec	$179	Recovers data from DOS 6.0 files.	5	6
Stacker 3.1	Stac Electronics	$149	Compresses files to free up disk space.	8	7
Hijaak Pro 2.0 for Windows	Inset Systems	$169	New import filter for Aldus graphics.	-	8
Windows for Workgroups	Microsoft	$250	Share data with networked co-workers.	6	9
CA-Clipper	Computer Assoc.	$795	Database application-development tools.	9	10

PERSONAL PRODUCTIVITY	VENDOR	PRICE	COMMENTS	JUL	AUG
Print Shop Deluxe 1.2	Broderbund	$50	Graphics, fonts, and headline effects.	3	1
Quicken 6.0	Intuit	$70	DOS-based money management.	1	2
Quicken 2.0 for Windows	Intuit	$70	Lets you organize finances with ease.	2	3
CompuServe Windows Kit	CompuServe	$50	Hundreds of online services and forums.	9	4
Colendar Creator Plus 5.0	Spinnaker	$80	A business or personal scheduler.	7	5
QuickBooks	Intuit	$140	Small-business accounting.	6	6
Money 2.0 for Windows	Microsoft	$70	An onscreen paper checkbook.	4	7
Quick & Easy for the SF-171	Datatech Software	$50	Automated application for federal jobs.	-	8
Print Shop Deluxe for Windows	Broderbund	$50	Choose from hundreds of graphics.	5	9
QuickPay for Windows	Intuit	$60	Works with Quicken for Windows.	-	10

These software charts are compiled monthly by G. Meier, Inc., which gathers ranked-order sales information from the following software industry sources: 800-Software; ABCO Distributors; American Software, Babbages; Baker & Taylor Software; CompuAdd; CompUSA; Computer Discount Warehouse; Dustin Discount Software; Electronics Boutique; Gate/FA; Ingram-Micro; Kenfil; Merisel; Micro Warehouse; Multiple Zones; Navarre; PC Connection; Software Resource; Software Spectrum; Software, Etc.; and Waldensoftware. The rankings reflect sales of more than $6 billion of software through tens of thousands of resellers. A weighting system is applied to each entry based on three factors: the entry's position in the individual chart, the power of the contributing source based on annual gross sales, and the relative strength of a source in a given category of software. All prices are suggested retail and are subject to change.

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- Local bus GUI accelerator with 1 MB video RAM
- 170 MB hard drive
- 4 MB RAM
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- 14" SVGA(i) monitor
- 3 ISA slots
- OverDrive socket
- MS-DOS® 6.0 and Windows™ 3.1

intel inside

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intel inside pentium PROCESSOR

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Whether you're upsizing or downsizing, Digital gives you one of the industry's broadest ranges of PCs — and all the extras that you need. Here's our list: six notebooks, nine value-priced desktops, five microtower desktops, five mini-servers, three servers, and the

Alpha-based DECpc AXP 150, the world's fastest PC. We also have a full selection of the industry's best printers, network equipment, the latest MS-DOS and Windows applications and other options. There's even a variety of leasing and payment plans to suit your needs.

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- **50MHz i486DX2** **$1,899**
- **66MHz i486DX2** **$2,099**
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- Local bus SVGA video
- GUI accelerator
- 4 MB RAM
- 1 MB video RAM
- 170 MB hard drive
- 3 ISA slots
- 4 drive boys
- 3.5" floppy drive
- 14" SVGA(i) color monitor
- Microsoft's Ready-To-Run MS-DOS 6.0/Windows 3.1
- Mouse
- 101-key keyboard

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- **33MHz i486DX** **$1,849**
- **50MHz i486DX2** **$2,049**
- **66MHz i486DX2** **$2,249**
- **Lease for as low as $56/Month**

- VESA-VL bus GUI accelerator
- 4 MB RAM
- 1 MB video RAM
- 170 MB hard drive
- 6 ISA slots (2 VESA-VL slots)
- 5 drive boys
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- Pentium™ OverDrive Processor upgrade
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- Microsoft's Ready-To-Run MSDOS 6.0/Windows 3.1
- Mouse
- 101-key keyboard

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- Local bus SVGA video
- GUI accelerator
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- 128 KB cache
- 1 MB video RAM
- 245 MB hard drive
- 5 drive boys
- 3.5" floppy drive
- Pentium OverDrive Processor upgrade
- 14" SVGA(i) color monitor
- Video adapter
- Microsoft's Ready-To-Run MS-DOS 6.0/Windows 3.1
- Mouse
- 101-key keyboard

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- 101-key keyboard
- Mouse

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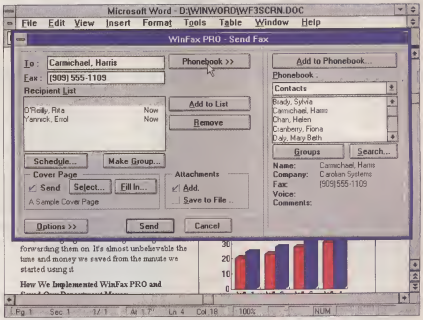

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Circle 227 on reader service card.

PCs Take Their Next Victim: Film. Sound Like a Kodak Moment?

FILM IS DEAD—IT'S JUST THAT NOBODY HAS COME AROUND TO pick up the corpse. It'll be another two or three years before the coroner arrives, but rest assured, he is on his way.

In film's place: digital imaging, which will take over in much the same way that CD recordings suddenly wiped out the vinyl pressings business. One day you walked into a record store to discover there were *no* records. Expect the same with film.

Don't get me wrong, I'm not telling you to go out and sell your photo equipment tomorrow (besides, most of the best digital image-capture devices will work with existing professional gear), but get ready to make a change.

What triggered my forecast? A killer product: the Kodak digital camera system (DCS), which the company loaned to me for a month. As an amateur photographer, I've always felt that a digital camera that produces high-resolution, easy-to-edit photos would eventually kill film. It just makes sense. Well, the Kodak DCS—a professional rig priced at nearly $10,000—already realizes that concept. Now all we have to do is wait for the price to drop by $9,000 or so—as it inevitably will.

The Coolest Camera Ever

Let me run down a few details on the Kodak DCS. It's a special camera back attached to a Nikon 8008. Inside, you can store 50 photos compressed onto an 80MB hard drive. You offload through a SCSI port using an Adobe Photoshop plug-in that comes with the camera.

If you've toyed with Logitech's Fotoman digital camera or any of the other low-resolution devices out there, believe me you're living in the past. The DCS takes a tremendous picture and leverages Photoshop, one of the greatest software packages I've ever used. Most cool graphics tools were restricted to Mac users, but now Windows users—equipped with 24-bit color—can also use these tools. Adobe Photoshop promises to be the single greatest addictive time waster ever produced for the computing public. Expect 12-step addiction-buster programs to keep people away from this slick image editor.

The first thing I did with the Kodak DCS and Photoshop—effortlessly—was transpose the head of one person onto another person's body. No problem. I also cleaned up a photo of myself taken with the camera, exported it to Painter 2.0, and made it look like a painting. It's pretty amazing. You can take the most screwed-up photo—the kind that you usually toss into the trash—and enhance it to the extreme. If you want to, you can take thousands of shots, look at them, erase the hard disk, and then start all over, keeping what few you desire. No film!

Take the most screwed-up photo and enhance it to the extreme.

Kodak's Counterpoint

As far as Kodak is concerned, film is not dead yet. A product manager was telling me about some newfangled superfilm the company will release soon. I'm sure that film will have its place as a niche product in the distant future, but for all practical purposes, film photography will eventually be as dead as the daguerreotype. Imagine an all-digital world where everyone can make—instead of just shoot—great photographs. Or should I say "images?" Furthermore, as the word processor defined the modern writer and opened the door to a new wave of scribes who could do better work on the computer than on the mistake-prone typewriter, so too will digital photography change the face of many businesses.

Newspapers such as the *San Francisco Examiner* already use high-band 8mm camcorders to capture images with the high-speed shutter enabled. The photographer simply chooses one high-resolution video image from thousands of frames, and into the paper it goes. The resolution of newsprint is not as good as that of a camcorder, so why not use an old-fashioned camera? With this technology you end up with some unusual newspaper photographs, that's for sure. Instead of using a 6-to-8 frame-per-second camera with a limited number of shots before you run out of film, you can shoot 30 frames per second for two hours solid! Then you can erase the cassette and reuse it! I used a similar technique on a recent trip to South Africa. I simply used a high-band 8mm camcorder with the 1/10,000 high-speed shutter enabled and stuck the camera out the window of a moving vehicle for about an hour, and I ended up with 108,000 still photographs. If I can't find something interesting in that pile, then things have to be mighty boring. Besides, I can transform even the most boring images with Photoshop.

While few people today will want to use their camcorders for photography, and fewer still can afford the $10,000 DCS camera, we will start to see other alternatives emerging. Canon, Yashica, and others have nifty digital cameras that store images on little 2-inch floppy disks.

Kodak knows all this is happening, and that's why PhotoCD was invented. I believe PhotoCD is ahead of its time and misses the mark for the consumer. Consumers may use a digital image, but who wants to watch their pictures on TV? People like putting photos in albums. A cheap color printer for digital photographs should be the next step in this evolution.

Of course that leaves Kodak out in the cold, doesn't it? One thing's for sure: If I were on the board of directors, I'd be plenty worried. ◩

PHOTOGRAPH BY EVAN MANAOR

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intel inside

PACKAGE 1

386SL Contenda: $1295
486SL Contenda: $1795

- 2MB RAM (386SL); 4MB RAM (486SL)
- 80MB IDE hard drive

PACKAGE 2

386SL Contenda: $1595
486SL Contenda: $1995

- 4MB RAM
- 80MB IDE hard drive
- External 3.5" floppy disk drive
- DOS 6.0, Windows 3.1, Lotus Organizer

PACKAGE 3

386SL Contenda: $1795
486SL Contenda: $2395

- 4MB RAM (386SL); 8MB RAM (486SL)
- 80MB IDE hard drive
- External 3.5" floppy disk drive
- Custom leather carrying case
- Extra battery
- Internal 2400/4600/4800 send/receive fax modem
- DOS 6.0, Windows 3.1, Lotus Organizer

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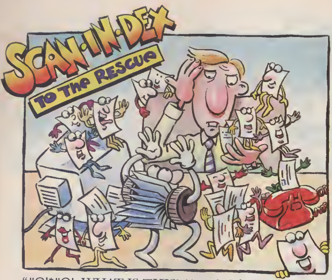
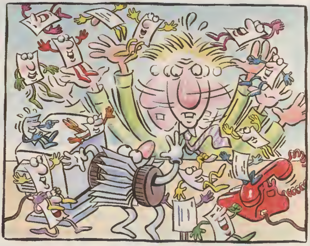
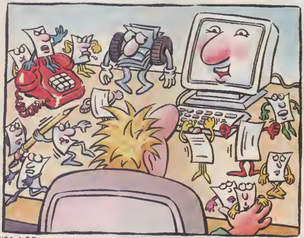
Circle 265 on reader service card.



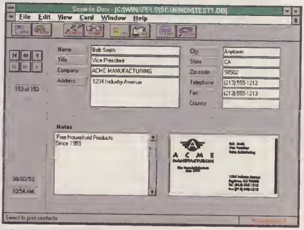
"#@!*#@!, WHAT IS THIS? 'Attack Of The Killer Business Cards'? They're everywhere ... and they're breeding. They multiply faster than my accountant!"



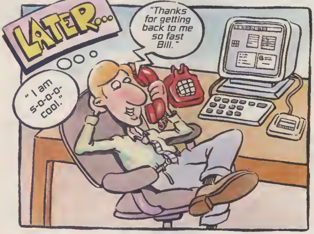
"They're attacking from all sides ... cards, card files and Rolodexes™ ... t-t-taking over!! AGH, I'm losing it! Paper shredder ... yeah, that's the ticket, shred 'em, go for the kill. What a nightmare! HELLLLLLLLLP!"



"Yo! Hey genius. Reee-lax. We know what's driving you looney, because it was driving us crazy too. That's why Microtek came up with the *Scan-in-Dex* ... Check it out." ☞

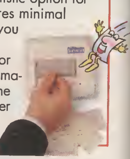


"*Scan-in-Dex*, scans, reads and records business card information in an electronic address book in seconds! Then you can print, search, or export the information. So what do you think Bub? Is this a solution to a problem or what?!"



Thanks to *Scan-in-Dex*, no more business card clutter. Just an automatic, low cost way to organize business card information into your computer. Now Bill has it all together. Cool, calm and in touch, (well, sort of cool??).

Scan-in-Dex solves the business card dilemma by eliminating the need for cumbersome card files. For the first time, accessing business contacts from a computer is a realistic option for busy people, because it requires minimal typing. Scan-in-Dex comes to you from Microtek, the leader in affordable desktop scanning for over a decade. For more information on Scan-in-Dex or the name of your nearest Microtek retailer call, 1-800-654-4160.



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Circle 280 on reader service card.

Stamp Out Computer Idiocy! Starting with . . . *Mine!*

YOU'LL HAVE TO—*OUCH!*—PARDON MY GENERAL ATTITUDE this morning—*ooh! wowch!*—if I seem a little disarrayed, I mean—*thud! whank!*—the weird sounds you hear emanating from the vicinity of my computer are of me—*thwap! zetz!*—kicking myself swiftly, roundly, soundly, because—*slam! ooph!*—I'm so . . . damn . . . STOOPID!

C'mon. That'll be just about enough of that. You're not the only idiot around here, are you, Spud? Just look at the people reading this. They do stupid things too, don't they? Well, don't you? Even if sometimes, you're . . .

Capable of massive intelligence? Am I not the dude who just this morning, when installing my new Microtek scanner, displayed feats of troubleshooting that would have made Werner Heisenberg proud? "I'm having some trouble ascertaining where exactly you believe this piece of equipment to be, pal," said the error code when I first attempted to access TWAIN through Photostyler, adding, of course, the much appreciated and cordial salutation "OK?"

It was sub-OK. I had to scan the corporate logo into the system within the hour if the opening of my full-color, massively pyrotechnical screen show for Mr. Lazenby was going to be enormously successful in concealing the true nature of our financial performance. So I clicked on Setup and saw a little schematic of where the software thought my interrupts were, as reflected in the dip-switch settings. Then I looked at the settings on the back of the interface card and noticed . . . *they were different!* After only eight or nine attempts to reconcile this difference through manipulation of the software setup, I got one of those bright yellow shafts between my eyes and saw the light: This here was a *hardware* thing! I changed the dip-switch settings to conform to what the software thought they should be—and *voilà!* That took brains, did it not?

How dumb can you be? Feeling rather smug about my immensity in the cerebellum department, I kicked back with my java and regarded the opening slide of the presentation I was about to offer. It was the initial slide all right, with my company logo standing up there all brisk and as ready for action as a teenage boy on his first date. Except the entire screen was black and white. For a guy expecting more colors than exist in nature, this gave me quite a start. But no problem. I had some time.

First I rebooted the machine, which often solves memory problems, and I was pretty sure that this had something to do with the way a screen driver was interfacing with an embedded Frisbee garnish someplace in my insufficiently robust operating system. That didn't work. But I wasn't fazed. Full of hubris and the remains of my morning bran muffin, I ran my Windows setup and changed screen drivers, which should have changed things. It didn't.

Lazenby's secretary, Margaret, called. Her boss was running early. Was I ready?

"Habada babada . . . I, er," I said.

"I'll take that as a yes," she said and hung up.

I was scared now, which is the only excuse I can offer for the fact that at this point I *reinstalled Windows,* muttering and wheedling God to help me, which he didn't.

I was almost weeping now. I could feel Lazenby entering the parking lot. I could sense him blowing his nose ostentatiously into his monogrammed hanky as he mounted the elevator, his stomach growling with hunger for the tender flesh of a midlevel vice president.

Doing what should have occurred to me before, I exited to DOS and ran my shareware golf game, which should have, of course, displayed its 16 colors of bit-mapped splendor. It did not. What could this be? A video card meltdown! I opened the box and reseated the card, blubbering like a bride left at the altar. I knew I was toast. Nothing would work until Lazenby was back in his limo, my *cojones* in his pocket. I closed the box and booted up.

The world was gray. My life was gray. My poupon was gray. That's when I saw it.

Idiot! Fool! Imbecile! I own a Nanao Flexscan. It's a very nice monitor, with convenient controls up front. The second knob from the left switches the display from white to amber to color. When I wiped the box in preparation for the show, I must have flipped that one little switch *for the first time in two and a half years!* I saw it just as Lazenby strode through my door with his overnight one-suiter and a sour expression.

"Sit down, Fred," I said, flipping the thing and watching my display bloom into 16,693 more colors than the rainbow. "You're going to love this."

What could this be? A video card meltdown! I was toast.

And he did, too.

Now that he's gone, though, I'm afraid. What's to protect me—any of us—from this kind of lapse in the future?

Education is the answer. Yeah. That and open, unashamed dialogue are the best weapons, I think, against computer idiocy. I've taken the first step. The rest is up to you. Write on paper if you must. Put it on the network if you can. But let me know your pain. No deed is too lame. No action too dim-witted. Together we can conquer this thing. And if we don't . . .

At least we can have a good laugh at your expense, you big knucklehead!

Gil means it! Confess your idiocy to him on PC/Contact via CompuServe (see page 326) or by mail at PC/Computing, *950 Tower Lane, 19th Floor, Foster City, CA 94404.*

PHOTOGRAPH BY RICHARD MORGENSTERN

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In a Color-Hungry World, Black and White Is Strictly for the Dogs

DO YOU HAVE A COLOR PRINTER YET? IT'S A BRIGHT Kodachrome world out there. Nobody buys monochrome monitors any more or uses black-and-white applications. Why shouldn't documents follow suit? Is it time to switch? John and Paul once again disagree.

SOMERSON: So John, are you still stuck doing your colorful OS/2 and Windows screen dumps and outputs in glorious black and white?

DVORAK: Of course, I use an HP 1200C at the moment and expect to try out the new QMS color laser printer. I think that black and white stinks. I never liked it on my screen—why would I want black-and-white printouts? Let's face it, we just *tolerate* black and white. What printers are you using? I'm sure you're the one using black and white. And by the way, who does screen dumps nowadays? Sheesh. It's 1993, check the calendar!

SOMERSON: Actually, the office is crawling with new color printers. They're hot. Everybody who touches one wants one. At least until they try to print sharp black text, or have to wrestle with ribbons, or juggle four colors of ink, or redo something six times to deal with those psychedelic-dithering woes, or send around a gorgeous waxy print only to have it return scratched and smeary. The QMS color laser is indeed an amazing machine. But it's also amazingly expensive. Still, those wizards at QMS did a really nice job.

You're right about the HP 1200C, by the way. For the bucks, it's without a doubt the best deal out there. But John, I'll bet you use a razor-crisp, black-and-white laser printer for most of your output.

DVORAK: It's not bad at $1,500 or so, but it shakes the building when that carriage flies back and forth. And it still looks like an ink jet when you get down to it. The QMS costs $10,000. Who can afford that? Although I suspect it will allow two-bit counterfeiters an easy road to riches. I don't know, I haven't seen the green ink on the thing. It may actually pay for itself. I can't figure out why the U.S. government hasn't made our money more complex. The old big bills from the late 1800s were more complex and better looking too.

But I digress. Maybe these color printers will force action. Now, as for your guess that I use a crisp black-and-white laser for most of my output—wrongo. Ninety-five percent of my output is pure electronic bits and bytes. I use electronic messaging with few exceptions. The only time I use the printer is when I'm writing a book proposal, a nasty letter to the newspaper, a shopping list, or creating a poster to find a lost cat. I suppose that you, Mr. Color Booster, are just cranking out tons of color output. I doubt it. And if you do, why?

SOMERSON: Hey, between MCI Mail, CompuServe, and Lotus Notes, we do almost all of our stuff electronically too. Sometimes we need hard copies, and with printers as cheap, gorgeous, and reliable as the HP LaserJet, black and white works fine for normal office output. However, for screen dumps (which we crank out by the bushel) and decent graphics, grayscale just doesn't cut it.

What's more important for us, though, is workgroup stuff. Someone will write a story and a dozen different people will comment on it and then comment on the comments. This works fine onscreen, where each person grabs a particular color, but when the story is printed on a LaserJet, any sense of identity disappears. While it is simple to instantly figure out who said what onscreen, this suddenly becomes a mess on the page.

Color can even help with more mundane things such as phone lists. Different departments or frequently called numbers can be color coded. And while we send hundreds of memos a day, we've learned that by highlighting one or two key words in red, we get faster response. Ditto with interesting spreadsheet figures. So what do you do with your color printer?

DVORAK: Personally, I think a tasteful black-and-white memo with good-looking fonts is as effective as anything fancier. The problem is that the chance of output looking gosh-awful increases when color is added to the mix. The big users of the color printers in my house are the kids. They love printing color pictures and drawings. I suppose they will be the ones who demand color in the future.

SOMERSON: You're missing the point, Dvorak. Sure, people can get too fancy with color just as they can with fonts, too many graphs, or weird desktop-publishing effects. That's not the point. The truth is that color—used intelligently—

PHOTOGRAPHS BY RUVEN AFANADOR AND RICHARD MORGENSTERN

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Circle 262 on reader service card.

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simply communicates better. If your bogus arguments were valid, we wouldn't need color monitors except to print kids' drawings. Here's proof: Have two businesspeople write two nearly identical memos. Make one of them all black and white. Add a few judicious spots of color to the other one. Put them side by side on a boss's desk. If they're otherwise identical, which one do you think the boss will pick up first?

DVORAK: In fact, I wonder whether we really need color monitors. The only reason that everyone turned to them is because they got so cheap that you could spend an extra $100 and have color. When that happens with printers, we'll see the same thing occur. Few users need color monitors except to needlessly jazz up their screens. But, heck, if it's about the same price, then why not? Information has nothing to do with color. But if you make both printers the same price then, then sure, I'd choose color.

SOMERSON: Apart from looking livelier, color conveys critical information better. I get two newspapers delivered every day (if you can call the *San Francisco Chronicle* a newspaper). Recently, both the *Chron* and the *New York Times* published the same front-page photo of a flood-ravaged home, except that the one in the *Chronicle* was in color. The *Times*' photo looked gray and murky and you couldn't tell what was going on. But the *Chronicle*'s color photo showed a tiny island of green safely sandbagged against a brown, muddy sea.

It's no surprise that the old gray lady *New York Times* is about to switch to color; they've already started. It's the same with PCs. In a year or two, when the price and performance of color laser printers improve, and when vendors polish slick technologies such as dye sublimation, nobody will use black and white anymore.

DVORAK: Yeah, sure. In what decade will that happen? And, sure, when you can print the family photos on the color printer, then everyone will want one. It's beside the point. When walking, talking computers come along, we'll want those too if the price is right. You keep ignoring the fact that the price isn't right and won't be for some time. That's the issue. These devices are too expensive today. And since when did this column become a sounding board for some distant future? Golly, Paul, I want a 2,048-by-2,048 monitor and a 2,000-dpi color laser printer. And you know what? Everyone else will want them too. Meanwhile, get practical. These things aren't ready for prime-time pricing!

Sure, when you can print the family photos on the color printer, then everyone will want

SOMERSON: Wrong again, John. People buy color and avoid black and white because we live in a color world. How many people buy black-and-white televisions? Virtually nobody. How would you feel if the magazines you read had no color? Or if the photos or the videotapes you took were strictly monochrome?

Where there's demand, there will be products. Build it, price it right, and they will come. Plummeting printer prices are going to be one of the big stories next year. The success of the Windows Printing System showed vendors that they could remove all the expensive smarts from the printer end and have the beefy processors of today's fast systems handle printing without a performance penalty. Black-and-white lasers will be flying off the shelves for just $300 to $400. Good-bye dot matrix forever. Color is farther back on the curve, but it's clearly coming down fast. Dye sublimation, which used to be a bargain at $10,000, is now shedding a thousand bucks every few months.

Every printer vendor is feverishly working on color lasers, which will be reasonably priced next year and will be a bargain the year after that. Color printers will be cheap and capable before you know it. And nobody will buy black and white. Businesses will instantly realize the communications benefits of color. And SOHO users won't be caught dead with black and white anymore.

DVORAK: By your logic, people should never have bought black and white in the first place, no matter what the price of color. You're in denial and back to that booster mode you so dearly cherish. Prices aren't dropping a thousand dollars a month! Give me a break.

SOMERSON: Once again, John, you've fallen and you can't get up. Nobody would have bought black-and-white anything in the first place if color technology and pricing had been farther down the curve. It's truly bizarre to go into any office these days and see full-color magazines, books, posters, paintings, screens, clothing—and then a sad grey island of memos on a desk. Apart from Woody Allen or Diane Arbus, black and white is an anachronism. Years from now this colorless PC output will seem as incongruous as black-and-white films where everyone is smoking cigarettes and tipping bellhops with nickels.

And wake up about prices too. They are plummeting, whether you like it or not. The same thing will happen to printers next year that happened to software prices this year. Including color. It's already starting.

DVORAK: Here, I have something for you. It's a box of crayons. You can scribble on your printouts and call it color. Oh, wait, maybe you don't need to. You must already have one of those dirt-cheap color lasers. Or do you? It took a lot longer for black-and-white printers to get below $1,000 than anyone thought. Color will take as long to drop in price. And if it's as important a need as you say it is, it will take longer because manufacturers will keep their prices and margins high. It may be a color world, but not for text. At least not today.

SOMERSON: Look, color will never be as cheap as a $300 black-and-white laser printer. But in a year or two the gap will be a whole lot narrower, and the advantage that color provides will easily be worth the difference. And you're wrong about text too (what a surprise)—color is unbeatable for highlighting and differentiating, and for letting workgroups sort out who did what. Our eyes work in color. Maybe in some dog world or insect universe, your slavish love of black and white will be acceptable. Not here. Our systems should be in color, all the way down the line. ◩

THE GATEWAY TO THE HOTTEST PC TECHNOLOGY ISN'T GATEWAY.

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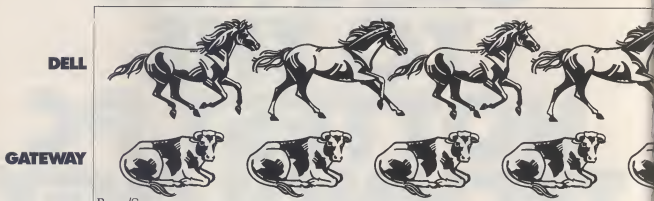
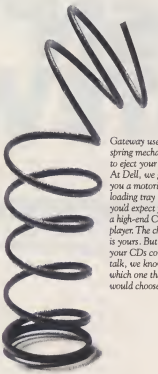
PCs DESIGNED FOR THE HIGH PERFORMANCE USER.

FAST
VS HALF-



With faster access and nearly double the data transfer rate, our double-spin CD ROM makes Gateway seem positively sluggish.

Thanks to our multi-session CD technology, you can have the disk printed on up to four different times, storing up to 100 color photographs in all.

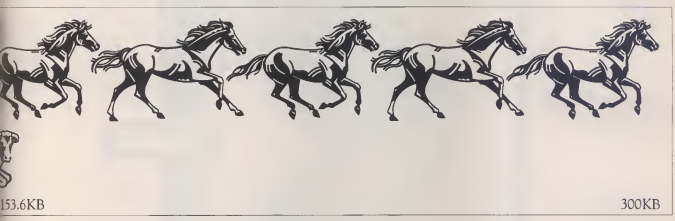


Gateway uses a spring mechanism to eject your disks. At Dell, we give you a motorized loading tray like you'd expect from a high-end CD player. The choice is yours. But if your CDs could talk, we know which one they would choose.

Whistle while you work. Or tap your foot. Or sing along. Our audio center CD ROM software lets you play disc jockey while you carry on with the important work of the day.

*All comparisons based on manufacturers' specifications. The Dell CD ROM is the Panasonic 563. Gateway's CD ROM is either a LMSI CM205 or a Sony CDU-31A. Dell disclaims proprietary interest in the marks and names

CDs FAST CDs.



When you buy a Dell Dimension™ XPS 450V or 466V equipped with a CD ROM, you get a CD ROM drive that runs circles around Gateway's.

Our CD ROM drive gives you nearly twice the performance of Gateway's thanks to advanced double-spin technology that doubles the transfer rate and helps to speed up access time. In short, it's faster.

And that's just the start.

Our drive has the automatic, push-button motorized tray you'd expect to find on a high-end CD player. So your CDs glide in and out effortlessly.

Gateway's has a manual spring-load reject, uh, eject button. It's still push-button, but your CDs don't glide effortlessly. In fact, they don't glide at all.

Ours is obviously a lot easier and more pleasant to use. And our CD ROM drive is built to last.

Our CD ROM is Kodak Photo-CD compatible. Which means you can take advantage of the latest in CD technology and view photographs on your PC screen.

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Our CD ROM also comes with software that lets you play your favorite tracks from any audio CD.

So you can listen to Mozart as you crunch numbers or bop along to the Beatles as you cruise your local BBS.

So if you want the best CD ROM technology for your money, make a fast decision and call Dell today.

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†Promotional price expires 9/30/93. *Performance measured by running WinBench version 3.11 at 1024 x 768, 256 colors, using Viper Video Driver ver. 1.1. **Dell assumes no responsibility for face-warping acceleration injuries. *Prices valid in the U.S. only. Some products and promotions not available in Canada. MS-DOS is a registered trademark and Windows is a trademark of Microsoft Corporation. The Intel Inside logo is a registered trademark and i486 is a trademark of Intel Corporation. ‡Leasing arranged by Leasing Group, Inc. Dell disclaims proprietary interest in the marks and names of others. ©1993 Dell Computer Corporation. All rights reserved.

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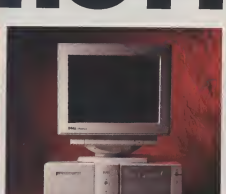

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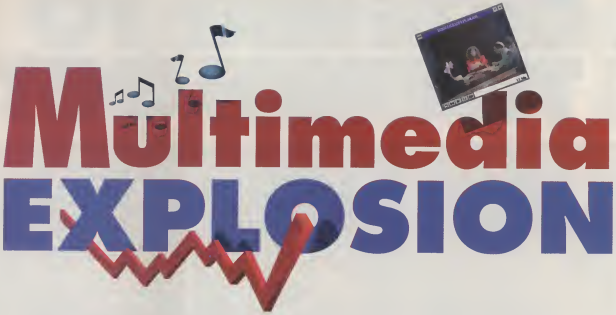


Introducing the new PC standard. Don't buy another PC unless it has all the right pieces.

BY ED BOTT

Let's talk multimedia. Wait! We know your eyes glaze over when you hear the *M* word. But this isn't about Bart Simpson sound effects or video clips of Geraldo Rivera's search for Al Capone's lost balance sheet. We're talking about down-to-earth technology with a real business payback. And it's here now.

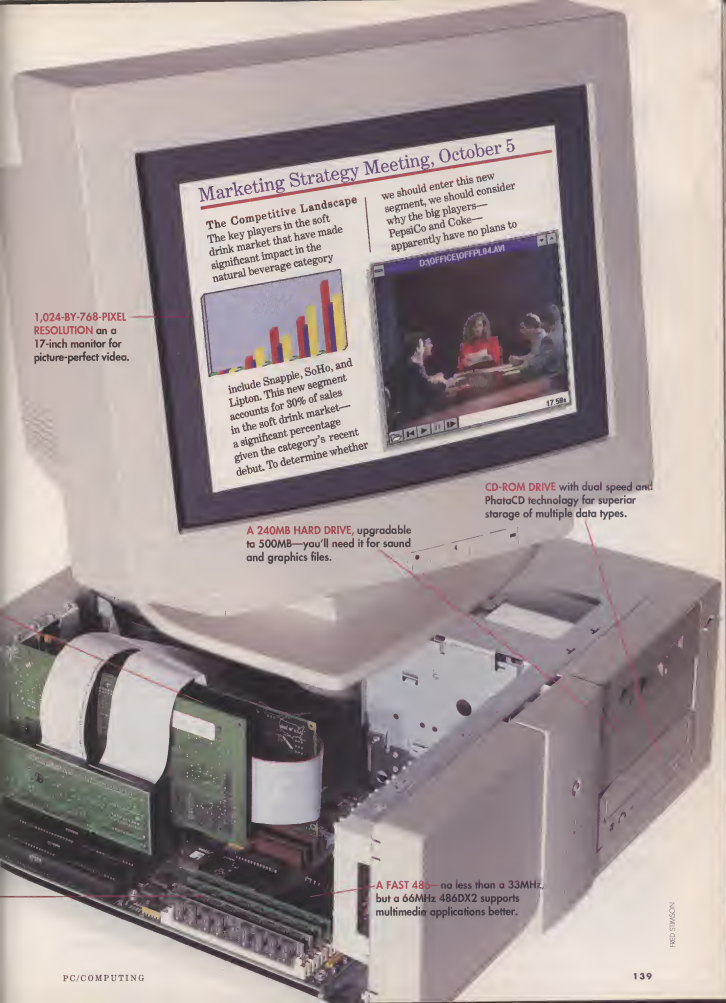
It's a shame that multimedia has such an image problem. Most businesspeople haven't yet discovered how it translates into productivity. They think that multimedia PCs are too slow and too expensive, that there's too much multimedia hype and too few applications. They figure that multimedia is for artists and game players, not for businesspeople.

They're dead wrong on all counts.

Today—right now—you can open a spreadsheet, click on an icon, and hear your sales manager explain why third-quarter profits are up. You can keep your audience awake with 20 seconds of Spielberg seamlessly integrated into a presentation. The same technologies that help you communicate better can also provide instant access to information: Now you can quickly scan half a gigabyte of CD-ROM data to build a killer mailing list or find the exact help you need in an online technical reference. And you can save time by installing software from a single CD-ROM disk instead of from 25 floppies. When you toss in voice-controlled

16-BIT SOUND CARD and a microphone for voice apps and presentations that sing.

8MB OF RAM, for acceptable Windows or OS/2 performance, upgradable to 16MB or 32MB.



FRED STRASCH

Coming Attractions: 8 New Jobs for Your PC

Fasten your seat belts. The new PC standard unleashes powerful new apps.

VOICE ANNOTATION

How it works: Records sound in o digital file ond attoches it to o selected paint in a document using object linking and embedding or a dynomic dota exchonge link. Far playbock, it lounches o sound player ond apens the voice-annototion file.

The payoff: Vocol sticky notes yau attoch to documents to enhonce the message.

What's required: A saund card, micraphone, ond saftwore thot supports vaice onnototion. All avoilable naw.

DATA DISTRIBUTION

How it works: Stores doto, images, digital audio files, or programs anto recardable CDs.

The payoff: Cast-effective distribution of large omaunts of doto: multimedio presentations, datobase files, progroms, images, documentotian, ond so on.

What's required: A CD-ROM recarder and o hard disk partition os large os the disk you want to produce. You con buy ar leose a CD-ROM recorder or have o service bureou creote a CD-ROM moster for yau. JVC affers a CD-ROM recarder system far less than $4,000.

VOICE COMMAND

How it works: Matches yaur spaken cammonds to "leorned" words and octivates o macro to carry aut recognized commands.

The payoff: Hands-free novigation thraugh windaws and spreadsheets, dato input, applicatian launching, document storoge ond printing, and so on.

What's required: A sound boord, voice-commond saftwore, a microphane of adequote quolity, sufficient processing pawer for real-time vaice-recagnitian saftwore, ond enaugh disk spoce to store the files.

CONTEXT-SENSITIVE HELP

How it works: Searches a CD-ROM for files relevant ta the current octivity.

The payoff: Instont occess ta help files.

What's required: A CD-ROM drive ond, if the help system includes videa ar sound files, o saund boord. Mare ond more opps include cantext-sensitive help (aften with full documentotian) on CD-ROM at no extra cost.

IMAGE DATABASE

How it works: Stares sconned, video-capture, ond PhotoCD images os items in datobase files an CD-ROM.

The payoff: Allaws yau ta include descriptive informotian with catalogs af imoges. Useful os support far security systems—ta create ID cords, for example.

What's required: CD-ROM drive with multisession PhotaCD,

applications, image databases, real-time videoconferencing, and an explosion of new applications and data, multimedia no longer seems like a gimmick.

So let's not call it multimedia. Let's call it the new standard for business PCs. It's the intelligent way to handle the barrage of different data types coming from every angle. Not just words and numbers, but multimegabyte chunks of graphics, sound, animation, even full-motion video. How do you get from here to there? In this special section, we introduce the new PC standard and show you the best buying strategies for putting it to work. But first, here's what this new machine can do for you.

SPEECH APPLICATIONS

Did you know that you can train the PC to perform a macro when it "hears" a word it recognizes? The macro executes a task as simple as entering a single keystroke or as complex as launching a communications session, downloading a stream of data, and graphing the results. This is *voice-command* software, and it's a useful tool for the disabled, or anyone who needs hands-free data entry. Eventually, you'll be able to control any application and input any data by voice. Creative Labs, Media Vision, and Microsoft—the leading names in sound boards—already toss in rudimentary voice-recognition software with their cards.

Another speech application, *voice annotation*, works like a spoken sticky note attached to a spreadsheet or word processing document. Windows already includes the software to record comments and embed them in documents that support object linking and embedding. A voice attachment requires more storage space, but it can convey shades of meaning that are easily lost in a typed note.

MULTIDATA DATABASES

There's more to life than ASCII text. Why not use a video-capture board and video source, or even a scanner, to snag photographics and store them as data items in

software for reading PhotoCD, o videa source, a video-capture card, and image-management software. All available now—including new digitol cameras for grabbing images and color printers for disploying stared images.

UNIVERSAL IN-BOX

How it works: Identifies an incaming call as fax, data, or vaice and lounches the apprapriote application.

The payoff: Lets yau send and receive sound, imoge, and text doto with ane device.

What's required: A baard with the appropriote DSP chips, such os Notional Semiconductor's Tyln 2000 software, plus saftwore managers, software far eoch cammunicatian process, o standard modulor RJ-11 connection, micraphane, and quolity speokers.

FULL-SCREEN VIDEO

How it works: Digitally campresses and decompresses video and audia signals using standard compressian methods—such os MPEG—and stares them on CD-ROM discs.

The payoff: Turns your PC into a theoter for viewing commercial ond carporote videos.

What's required: CD-ROM drive with minimum transfer rote of 150K per second, using on odd-in boord with an MPEG chip, a system with an MPEG chip installed an the motherbaord, ar a video baard with an MPEG chip installed.

VIDEO-CONFERENCING

How it works: Supports voice, doto, and video exchanges from the desktop using digital ar standord phone lines.

The payoff: Creotes "virtuol meeting rooms" that let yau see ond talk with people ot different locotions while calloboroting anscreen.

What's required: Saphisticoted setups include a video comera, on ISDN voice terminol, full-motion video, a graphicol communicatian-session manager, ond saftwore thot links a dotobose of phone numbers, e-moil oddresses, and imoges; controls voice colls; and supports colloboratian.

image database files? The California Department of Motor Vehicles already uses a digital camera system to assemble driver's licenses. Some membership warehouses, such as Costco, produce membership cards with digital images. By linking PhotoCD image collections with Windows database applications, you can put thousands of photos at your fingertips. All you need to get started is a CD-ROM or a Logitech FotoMan, plus a copy of Paradox or Superbase for Windows. Oh yes, and puh-len-ty of hard disk space.

And you don't have to stop with still images. Database files, digital audio collections, programs, *context-sensitive help*—almost anything digital—can be captured on recordable CDs for *data distribution*. You'll need a CD-ROM master disk—if you do the setup work, a service bureau can create one for you for about $200. Blank disks cost between $25 and $40 each.

If you want to dive into the deep end, prices for recordable-CD systems, including those specifically designed to support the PhotoCD format and to allow multisession recording, start at about $4,000.

INTEGRATED TECHNOLOGIES

Take a digital signal processor (DSP), add a few off-the-shelf components and the software to manage a handful of tasks simultaneously, then connect the system to a telephone line. Now you have the *universal in-box*. It's a voice-mail system that can also route faxes and handle point-to-point telecommunications. With a little extra software, it even doubles as a sound card, controlling and mixing output from different audio sources. At least one board, National Semiconductor's TyIn 2000, makes it all possible—for less than $300.

Unite full-motion, *full-screen video*, and CD-quality audio—and say "Hello Hollywood." Broadcast-quality video clips can be digitally compressed and stored on CD-ROM. During playback, a special chip expands the data, producing up to 79 minutes of full-motion video and CD-quality sound per disk. When the flood of full-motion video titles hits the market, look for CD-ROM encyclopedias, video clip collections, training disks, and even movies. In addition to a CD-ROM drive, you'll need a custom card (in the $300-to-$400 range) to handle on-the-fly video decompression.

While very high compression and decompression rates are required for sophisticated *videoconferencing*, you can assemble a usable, useful video-communications system with a little software, a standard phone line, and a high-speed modem at each end of the connection. TelEye-Vision 500, a $495 software package from EyeTel Communications, compresses, decompresses, and transfers high-resolution images. For $400 more you can add a custom video board that enables capture and transfer of still images, and transfer of continuous images with a new frame every 15 to 20 minutes.

Or consider EyeTel's video mail package. You record a video, run the compression software, and send the file overnight to another video mailbox. The $3,000 price isn't loose change, but it's a whole lot cheaper than renting a videoconferencing suite from Sprint. Another bonus: You never have to leave the office.

PUTTING IT TOGETHER

Now that you know what the future holds, we'll let you in on the best part: You can prepare for it today. Here's how to buy the right PC—right now—that will support the next generation of applications.

A fast 486. You'll probably need a 486DX2/66, maybe even a Pentium—to drive computation-hungry spreadsheets and presentations. For our reviews of high-powered systems beginning on page 144, we established a 486/33 as the bare minimum. Thanks to Intel's MVP award-winning OverDrive technology, it's a cinch to upgrade this chip to a faster CPU.

8MB of RAM. Demand at least 8MB, with the capacity to grow to 16MB or 32MB. You'll need the RAM to coax acceptable performance from Windows or OS/2.

A 240MB hard drive. There's no such thing as too much storage. Once you begin working with sound and high-resolution graphics files, your 240MB hard drive will start to feel as cramped as the downbound elevator at quitting time. It's a start, but the even better option is investing in a 500MB SCSI drive.

1,024-by-768-pixel resolution. You should be able to see 786,432 pixels. That's how many you get at 1,024-by-768 resolution, and it's the only way to go if you typically run four or more Windows applications at once. They should be neatly arranged on a 17-inch monitor driven by a video adapter equipped with 2MB of video memory and plugged into a VESA VL-Bus slot. If the adapter will support a resolution of 1,280 by 1,024, so much the better.

A 16-bit sound card. If your PC could talk, it would demand a 16-bit sound card *and* a microphone. The combination lets you convert sound into data files and use it for voice-annotated documents, voice-controlled applications, talking presentations, and more.

CD-ROM drive with dual speed. The lowly floppy disk is about to be replaced by the CD-ROM as the best way to deliver software and huge quantities of data. It's about time. Insist on a dual-speed or, better yet, a quad-speed CD drive that supports the Extended Architecture and Kodak PhotoCD standards.

GETTING THERE FROM HERE

Before you call your distributor and start haggling over discounts and delivery dates, consider the best way to get from your current system to the new PC standard. There are two roads you can take if your system doesn't measure up: You can purchase a completely new, fully loaded multimedia PC or you can roll your own.

Want hassle-free power out of the box? Check out page 144 for our review of complete multimedia PCs. All you'll need is a fax modem (see "Fast and Easy Faxes," page 230).

If you decide to roll your own, buy the fastest, most reliable PC you can find, then add sound, CD, and fax. If you're satisfied with your current PC—and it meets our innards requirements—you'll be faced with the same choices as the roll-your-owners. We review every key multimedia device in this story.

CD-ROM drives are the heart of any multimedia PC, and we put six top models through rigorous speed tests. Investigate the results of our tests on page 157. If you need a sound card, check out our reviews and compatibility testing of six 16-bit cards on page 152. If your system didn't come with speakers, tune into the results of our jury testing of 15 top amplified loudspeakers on page 160.

Or you might consider a multimedia upgrade kit complete with CD-ROM drive, sound card, and CD-ROM titles. We review several of the top kits on page 158.

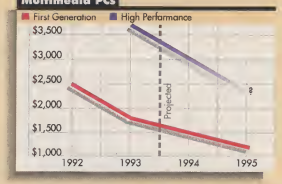
Ron White wore out his glasses surveying hundreds of CD-ROM titles to find the top eight in several categories. He reveals his choices on page 168. Finally, on page 188, we consider what the next PC standard might deliver—fasten your seat belts.

John Montgomery, Mike Hogan, and Mark Brownstein contributed to this story.

MULTIMEDIA REALITY CHECK

Performance is up and prices are down. It's time to buy.

If you spec'd your last PCs *sans* multimedia because CD-ROM drives were too slow, the sound was too tinny, and you just couldn't justify the expense, it's definitely time to take another look. Dramatic improvements in CD-ROM drive performance, the availability of 16-bit sound cards, and practical sound software, along with more than 3,000 CD-ROM titles have transformed multimedia PCs from pricey toys into must-have workhorses. Prices on first-generation systems are dropping through the floor, and high-powered systems just get better—and cheaper. Say no more.



Source for First-Generation Data: Multimedia Computing Corp.

INTRODUCING THE PERFECT WAY TO GET AHEAD AT THE OFFICE.

C·H·E·A·T.

NEW MOUSEMAN® CUTS NEARLY 50% OFF THE TIME IT TAKES TO EXECUTE ROUTINE COMMANDS.[1]

Get a leg up on those other Joes with the mouse that makes it easy. MouseMan comes with software that lets you execute one of dozens of commands (including double click) with a single click, *without* fiddling with pull-down menus. We've taken the shape 77% of mouse users called "most comfortable" and added finger grooves, lower force switches, teflon feet, and a more flexible cord. Of course, if you're already using a Logitech mouse, you can upgrade to our latest software for only $19 by ordering direct at **1-800-732-3020.**[1] From Logitech, the company that's made twice as many mice as the next guy.

MouseMan® Cordless

TrackMan® Portable

TrackMan II

LOGITECH

The Senseware™ Company

Circle 130 on reader service card.

[1] Based on independent tests. Plus $3 handling & shipping. Offer valid for US & Canada only. Trademarks belong to their respective owners.

Loaded and Ready for Action

Buy a maxed-out multimedia PC.

BY JOHN MONTGOMERY

While you're playing phone tag, the competition is merging voice mail with e-mail, distributing data on CD-ROM, and motivating its sales forces through videoconferencing. The next generation of applications has arrived.

If your system can't run them, find one that can.

PC/Computing evaluated five high-powered, fully loaded PCs from pioneering system designers: ALR's Evolution IV MPC, Dell's Dimension XPS/466V, IBM's ValuePoint 6384-MS9, Insight's 486DX2-66 VL/EISA MM, and Micro Express's MicroFlex VL/Multimedia. Every system meets or exceeds our requirements for tomorrow's PC, but none meet all the requirements for our advanced specification. All survived our strenuous performance testing of the CPU and CD-ROM drive as well as a juried review of the sound quality. We found that two systems stood out: the Micro Express MicroFlex for its remarkably low price and the Dell Dimension for its knock-your-socks-off performance.

PERFORMANCE OR PRICE?

The MicroFlex system is the least expensive of those we tested ($2,750) and boasts some of the best desktop and CD-ROM performance results, but it was the only system that doesn't come bundled with CD-ROM titles. It also was the only one with a non-Intel CPU—Cyrix's 40MHz CX486S. Still, it does include the well-regarded Media Vision Pro AudioSpectrum 16.

The $4,238 Dell Dimension astounded our performance experts. After Dell's system blew away our standard desktop PC tests, we picked our jaws up off the floor and grabbed the phone. Dell avoided saying just how its design produced such great results, but our lab ran enough tests to uncover the secret: a little extra cache and an enhanced IDE controller. These improvements result in a snappier response when you double-click on a program icon, skip around complex documents, or scroll through tables and graphs. The Panasonic CR-563 CD-ROM drive also delivered extremely high performance in our tests, which means less drag on the CPU when you access CD-ROM files. The Dell costs a bit more than most of the systems we tested—but its superior performance could make up for the higher price.

At $3,129 the IBM ValuePoint maintained respectable performance not only in the CD-ROM tests but also in benchmark tests simulating everyday word processing and spreadsheet use. What we liked most was the case. While you need a screwdriver to open most PCs, the ValuePoint has a solid, screwless design that is easy to open and close—which makes upgrades a snap. We also were impressed by the array of CD-ROM titles bundled with the system and the one-year onsite service warranty.

The $3,601 ALR Evolution features the

PC Computing BEST

MULTIMEDIA PC

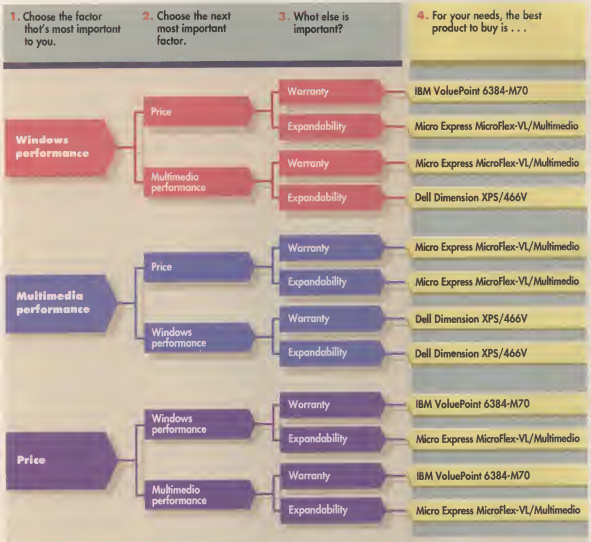
Dell's Dimension XPS/466V rips through Windows—at a price.

It's fast. It's sleek. It's Dell's Dimension XPS/466V multimedia monster. Boasting a 66MHz 486DX2 processor and a built-in local-bus disk controller, the Dimension is by far the fastest Windows system we tested. Multimedia performance was excellent thanks to its Panasonic CR-563 CD-ROM drive. One drawback, however, is the Creative Labs Sound Blaster 16 sound card. Another is the $4,238 price tag—higher than most of the other systems we tested. Sometimes you can't have it all.

Dell Dimension XPS/466V • $4,238 • Dell Computer Corp. • 9505 Arboretum Blvd., Austin, TX 78759 • (512) 338-4400
Circle No. 661 on Reader Service Card

PC/COMPUTING DECISION MAKER

Which multimedia PC is right for your business?



Media Vision Pro AudioSpectrum 16, which won top honors in our review of sound cards (see "Listen Up! Sound Cards Aren't All Alike," page 152). The ALR bundle includes Media Vision sound mixing and recording software, plus a balanced selection of CD-ROM titles such as *Microsoft Bookshelf* 1993 Edition, *Cinemania,* and *Multimedia Works 2.0.* While the ALR performed well and has a reasonable price, it pales next to the low-cost powerhouse MicroFlex and pedal-to-the-metal Dimension.

You also should know that during testing, we had some problems with the $4,899 Insight 486DX2-66 system. After one day of testing, its Asus SCSI controller failed. Insight's excellent technical support promptly sent us a new BIOS for the system, but it arrived with bent pins. After we installed the new BIOS, the system again worked perfectly, but the day after we finished testing it failed to boot. To top that off, the ribbon cables inside the box were glued to their connectors and the floppy drive cable wasn't connected at all.

Insight delivered a second system to our lab and it ran without a hitch. We explored the nine CD-ROM titles bundled with the system (including *Lotus 1-2-3 with Multimedia Smart Help)* and the sound software that runs with its Media Vision Pro AudioSpectrum 16 card. Maybe the first system *was* a one-time glitch after all, but we wanted to give you the whole story.

The Dell Dimension XPS/466V has no competition. Its outstanding CPU and video performance, coupled with a high-quality CD-ROM drive, deliver a solid all-in-one solution that will support the next generation of applications.

Is There a Clear Winner? You Bet

Five systems made the cut, Dell changed the game. We want one.

Dell Dimension XPS/466V

Faster than greased lightning.

Pros: The high flyer in CPU and CD-ROM tests, great warranty.
Cons: Slightly more expensive than the competition.

Specs: Intel 486DX2/66; local-bus IDE interface; #9 GXe video card in VL-Bus slot; 4 ISA slots, 1 VL bus slot free; 3 external, 2 internal drive bays; 3MB of video memory as tested and maximum.
Sound card: Creative Labs Sound Blaster 16 with ISA bus, 5KHz-to-45KHz sampling range, MIDI interface, CD audio in.
CD-ROM drive: Panasonic CR-563 with 300Kps data transfer, 64K buffer.
Support: 24-hour, toll-free tech support, onsite service, 30-day money-back guarantee, one year parts and labor.
Titles: *DigiVox Sound Effects Library* and *Multimedia Sound Studio, ZSoft Photofinish.*
Sound software: First Byte's Monologue for Windows.
Peripherals: Labtec speakers and microphone.

$4,238 • Dell Computer Corp. • 9505 Arboretum Blvd., Austin, TX 78759 • (512) 338-4400
Circle No. 661 on Reader Service Card

ALR Evolution IV MPC

You have to pay to play.

Pros: Built-in ethernet adapter, good range of bundled titles.
Cons: No onsite warranty, so-so performance, a bit pricey.

Specs: Intel 486DX/33; local-bus IDE interface; video card on proprietary VL-Bus slot; 4 ISA slots, 2 VL-Bus slots free; 3 external, 3 internal drive bays; 2MB of video memory as tested and maximum.
Sound card: Media Vision Pro AudioSpectrum 16 with ISA bus, 2KHz-to-44KHz sampling range, MIDI interface, external line in, SCSI support.
CD-ROM drive: Texel DM-3024 with 300Kps data transfer, 64K buffer.
Support: 5 years motherboard and CPU; 15 months parts, labor, and peripherals; optional onsite service.
Titles: *Kodak PhotoCD Access and Photo Sampler,* and *Microsoft Bookshelf,* plus 5 more.
Sound software: Media Vision Pro AudioSpectrum 16 drivers, Pocket Recorder, plus 2 more.
Peripherals: Ramtronics internal speaker, Labtec microphone.

$3,601 • Advanced Logic Research • 9401 Jeranimo, Irvine, CA 92718 • (800) 444-4257, (714) 581-6770
Circle No. 662 on Reader Service Card

IBM ValuePoint 6384-MS9

Big Blue gets the details right.

Pros: Reasonably priced, solid design, good performance, lots of bundled titles.
Cons: Needs a better sound card.

Specs: Intel 486DX/33; proprietary IDE interface; video graphics on VL-Bus; 4 ISA slots, 1 VL-Bus slot free; 3 external, 2 internal drive bays; 1MB of video memory as tested and 2MB maximum.
Sound card: Creative Labs Sound Blaster 16 with ISA bus, 5KHz-to-45KHz sampling range, MIDI interface, CD audio in.
CD-ROM drive: Matsushita CR 563-B with 300Kps data transfer, 64K buffer.
Support: 1 year onsite.
Titles: Broderbund *Grandma and Me,* LucasArts *LOOM, Microsoft Multimedia Works, Software Toolworks Encyclopedia,* plus 7 more.
Sound software: Creative Labs' WaveStudio, Sounde'LE, Talking Scheduling, plus 6 more.
Peripherals: Sound Blaster external speakers, Fico microphone.

$3,129 • IBM • 1133 Westchester Ave., White Plains, NY 10604 • (800) 426-2968
Circle No. 663 on Reader Service Card

Wanna see the Dell Dimension XPS/466V fly? Wanna see it again?

ALR's Evolution IV MPC comes network-ready with built-in ethernet.

The IBM ValuePoint 6384-MS9 bundles a passel of software and CDs.

PHOTOGRAPHS: ROBERT CARDIN

Insight 486DX2-66 VL/EISA MM

Bungled design, big bucks.

Pros: Tons of bundled software, good overall performance.
Cons: Poor system design, high price.

Specs: Intel 486DX2/66; SCSI EISA card; video on VL-Bus, 8 EISA slots and 1 VL-Bus slot free; 6 external, 1 internal drive bay; 1MB of video memory as tested and maximum.
Sound card: Media Vision Pro AudioSpectrum 16 with ISA bus, 2KHz-to-44KHz sampling range, MIDI interface, CD audio in, SCSI support.
CD-ROM drive: Talon TA200 with 300Kps data transfer, 64K buffer.
Support: 1 year parts and labor.
Titles: Cambrix's *National Parks Guide,* Compton's *Software Jukebox,* plus 6 more.
Sound software: Media Vision's Stereo Studio FX, SP Spectrum Software, Controlled Mixer, plus four more.
Peripherals: Altec Lansing speakers, Labtec microphone and headphones.

$4,899 • Insight Direct • 1912 W. Fourth St., Tempe, AZ 85281 • (800) 927-7848, (602) 902-1176
Circle No. 664 on Reader Service Card

Insight's multimedia tower boasts a total of six external drive bays.

Micro Express MicroFlex VL/Multimedia

Fast and dirt cheap.

Pros: Low price, excellent performance.
Cons: Not enough bundled software.

Specs: Cyrix CX486S/40, 40MHz, proprietary IDE interface; VL-Bus video; 3 ISA slots, 1 VL-Bus slot free; 5 external, 2 internal drive bays; 2MB of video memory as tested and maximum.
Sound card: Media Vision Pro AudioSpectrum with ISA bus, 2KHz-to-44.1KHz sampling range, MIDI interface (requires MIDI Mate, not included), CD audio, SCSI support.
CD-ROM drive: Toshiba 3401 with 330Kps data transfer, 256KB buffer.
Support: 1 year onsite for $50.
Titles: None.
Sound software: First Byte's Monologue for Windows, Media Vision's Pocket Tools and Track Blaster Pro, MidiSoft's Recording Session.
Peripherals: Labtec speakers and microphone.

$2,750 • Micro Express • 1801 Carnegie Ave., Santa Ana, CA 92705 • (800) 989-9900, (714) 852-1400
Circle No. 665 on Reader Service Card

The MicroFlex's multimedia mini tower sports a 40MHz Cyrix chip.

The Next Wave

More action on deck.

Only a handful of systems met our standard specification. But by the time you read this, many more vendors will be rolling out new high-powered systems. We polled the major vendors just before we went to press; this is what they leaked to us.

AST: Now playing. You'll know AST kept to its schedule if you see the AST 486/33 Advantage Pro and 486/66 Advantage Plus systems in mass-market channels.

Compaq: No immediate plans. Compaq has no immediate plans to deliver a system with dual-speed CD-ROM drives.

Digital Equipment Corp.: Watch this space. In multimedia, at least, DEC is behind the technology curve. A spokesman assured us that DEC plans to "keep competitive with the industry."

Epson: Soon, very soon. At press time, Epson could deliver a system with everything but a dual-speed CD-ROM drive for around $3,000. Expect Epson to offer the missing component—soon.

Gateway: The right stuff. New systems with almost all the right stuff should be rolling out of South Dakota this fall. No names or prices yet.

Hewlett-Packard: Major holiday announcements. Look for HP's high-performance multimedia machines this fall with a price tag of $2,800. Around Christmas HP will announce new machines "in line with our business communications strategies."

Zeos: As you like it. Zeos will customize a system that meets our specs for about $3,000 in the Zeos Upgradable line.

OUR REVOLUTIONARY *new* COMPUTER *is clearly* FAMILY COMPATIBLE.

• • •

107 MB hard drive and 4 MB RAM allow you to run sophisticated Windows-based software with ease.

Exclusive WinMate software makes using Windows easy and helps organize households to home businesses.

An Intel 25 MHz 486 SX microprocessor breezes through IBM-compatible software programs.

Super VGA graphics make everything on-screen look sensational.

Multimedia sound gives audio appeal to games, presentations, even homework.

A wealth of bundled software includes Microsoft Windows 3.1, Works, the Microsoft Bookshelf for Windows CD-ROM reference library and Microsoft Money.

A built-in send-fax/modem helps you conduct business and use your MPC as a voice mail system for the entire family.

Leading-edge CD-ROM technology lets your family bring interactive information to life.

MICROSOFT WINDOWS

• • •

From the start, the Tandy Sensation was bound to be a family favorite. It's practical, but fun. Sophisticated, but easy to use. No wonder this Radio Shack multimedia PC has already won the hearts of so many experts. Now, though, it's your seal of approval we're after. Because we designed the Sensation with families

intel inside

The intel inside logo is a registered trademark of Intel Corporation. IBM is a registered trademark of IBM Corp.

And APPARENTLY, CRITIC COMPATIBLE, TOO.

"The Tandy Sensation is a rich collection of well-integrated programs and hardware in a clean, handsome package."

-Jim Canning, Michael McCarthy
InfoWorld

"It's a dandy multimedia computer. The Sensation is worth serious consideration if you're shopping for the multimedia experience."

-Larry Blasko
AP

"Tandy's Sensation is aptly named. Urge anyone looking for a good all-around MPC system to test-drive the Sensation."

-Greg Loveria
BYTE

"The Sensation is not only easy to use, but quite a multimedia Swiss Army knife."

-Selby Bateman
CD-ROM Today

"Tandy's Sensation is a state-of-the-art home computer that works well and offers a lot for the money."

-Howard Blumenthal
Hardware Review, United Feature Syndicate

"The Sensation is an excellent machine that does a lot and does all of it well."

–Eddie Huffman
Compute

like yours in mind. Its multimedia capabilities and user-friendly technology mean everyone in your home can put it to use. So why not put it

to the test? Experience the Sensation firsthand at your neighborhood Radio Shack. Chances are, you'll find it's compatible with you, too.

Radio Shack®

Circle 190 on reader service card.

Microsoft Windows, Works, Microsoft Bookshelf and Microsoft Money are registered trademarks of Microsoft Corp.

The Guts of the Dream Machine

If you know what you want, build your own. BY MATTHEW LAKE

If you already have a fast 486 with plenty of storage and memory, don't ditch your system—upgrade it! We've hacked our way through the thicket of upgrade technology to find the best sound cards, CD-ROM drives, speakers, and complete upgrade kits to ready any PC for the next generation of applications.

SOUND INVESTMENTS

Serious applications like voice annotation and voice command require 16-bit recording and playback, not the tinny sound you hear from 8-bit cards. That's the same standard we established for the Hardware Buyer's Superguide in June (page 124). What changed since then? We did. We upped the ante by testing not only the cards' sound quality but also their compatibility with best-selling systems. And our Usability Lab tested how easy the boards are to install and to use to record, play, and mix sound. Our top pick? Media Vision's Pro AudioStudio 16. It delivers a solid package for business users. For a close-up look at all six sound-card finalists, see "Listen Up! Sound Cards Aren't All Alike," page 152.

MORE DRIVE

In four short months the capabilities of CD-ROM drives have increased dramatically. All the drives we considered for this review are dual-speed models that move data at 150K and 300K per second; both speeds are essential for transferring large sound and graphics files. And all the drives were designed to read PhotoCD images recorded on the disc over multiple sessions. All vendors don't offer this relatively new technology, and those that do have short supplies. But if your drive doesn't include this capability, you're ignoring one of the fastest growing data sources around. The Chinon CDX-535 retrieved images from a multisession Kodak PhotoCD faster than any other drive we tested. And it outperformed the competition in brand-new tests: We measured how quickly data is transferred from the CD-ROM to the PC and how much that process drags on CPU performance. To find out how all six CD-ROM drive finalists measure up, see page 157.

SPEAK TO ME

What good's first-rate sound if the speakers that amplify it are second-rate—or worse. Editor-in-Chief Paul Somerson led the campaign to search out the highest quality multimedia amplified loudspeakers. And because

PC Computing BEST

BEST SOUND CARD

Media Vision Pro AudioStudio 16: Well-rounded sound.

You can pick the Pro AudioStudio 16 out of a crowd with your eyes closed. The best FM-based board we tested, it features high-quality recording and playback.

Pro AudioStudio 16 • $349 • Media Vision • 3185 Laurelview Court, Fremont, CA 95438 • (800) 348-7116, (510) 770-8600
Circle No. 666 on Reader Service Card

BEST CD-ROM DRIVE

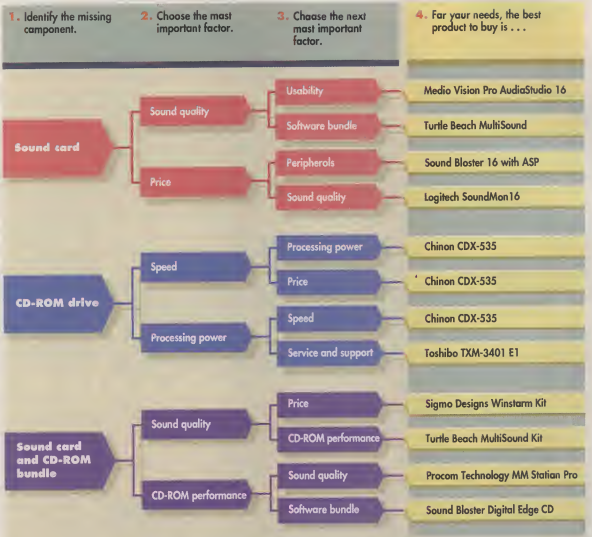
Chinon CDX-535 delivers the data in no time flat.

With a daylight lead in our benchmark and real-world application tests, the Chinon is both zippy and reasonably priced. The 256K cache makes all the difference: It retrieved images from a Kodak PhotoCD faster than any other finalist.

Chinon CDX-535 • $795 • Chinon America • 615 Hawaii Ave., Torrance, CA 90503 • (800) 441-0222, (310) 533-0274
Circle No. 667 on Reader Service Card

PC/COMPUTING DECISION MAKER

Which multimedia device is right for your business?



sound is the most important factor, we jury tested 15 multimedia amplified loudspeakers from 6 top manufacturers. In our tests, Acoustic Research simply blew the competition out of the water. In fact, Acoustic Research speakers took four of the top six slots, leaving room only for Sony's top-of-the-line and one pair from Apple. To get all the details on the six top contenders, see "Shake, Rattle, and Roll," page 160.

THE BUNDLE BUNGLE

What? A compatible CD-ROM drive and sound card in a single package, plus titles, a microphone, and speakers? It sounds too good to be true—and it often is. Most bundles demand a compromise: Some stick you with a proprietary SCSI adapter that leaves you in never-never land when you need to upgrade; others offer only single-speed drives; and a few don't even tell you whose drives or sound cards are in the kit. We've identified a handful that offer the right stuff: dual-speed CD-ROM drives, a 16-bit sound card, the necessary drivers, and some titles so you can get right to work. Still, each kit has particular strengths; for instance, the sound quality in the Turtle Beach kit is absolutely top notch, but the software bundle is better designed for sound engineers than business users. Creative Labs' Sound Blaster Digital Edge CD won us over with its well-balanced package: While the sound quality is only adequate, the CD-ROM performance shines, and we found the business value of its no-nonsense software bundle and CD-ROMs right on target. To get the full specs on all the upgrade-kit finalists, see page 158.

Listen Up! Sound Cards Aren't All Alike

We pumped up the volume on six 16-bit sound cards.

Media Vision Pro AudioStudio 16

Smooth sound, super support.

Pros: Great support, built-in SCSI connector. **Cons:** Wimpy microphone, confusing installation.

Specs: ISA bus, Sound Blaster support, 6kHz-to-44.1kHz sampling range, MIDI interface with MIDI Mate, CD audio in, SCSI support, Media Vision microphone, 11 sound packages.
Support: 3 years, toll free.

$349 • Media Vision • 3185 Laureview Court, Fremont, CA 94538 • (800) 845-5870, (510) 770-8600
Circle Reader Service No. 666

Creative Labs Sound Blaster 16-ASP

Slick software, so-so sound.

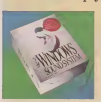
Pros: DSP chip on board, impressive bundle. **Cons:** Second-tier recording, no SCSI support.

Specs: ISA bus, 5.5kHz-to-44.1kHz sampling range, MIDI interface, CD audio in, no SCSI support, Creative Labs' Microphone, 9 sound packages.
Support: 1 year parts and labor.

$349.95 • Creative Labs • 1901 McCarthy Blvd., Milpitas, CA 95035 • (800) 998-5227, (408) 428-6600
Circle Reader Service No. 669

Microsoft Windows Sound System

Scratchy sound, trouble up front.



Pros: Practical software. **Cons:** No SCSI support.

Specs: ISA bus, Sound Blaster support, 5.5kHz-to-48kHz sampling range, MIDI playback, CD audio interface via analog connector, Microsoft headphones and microphone, 3 sound packages.
Support: 1 year parts and labor, hardware; 90 days, software.

$289 • Microsoft • 1 Microsoft Way, Redmond, WA 98052-6399 • (800) 426-9400, (206) 882-8080
Circle Reader Service No. 670

Logitech SoundMan 16 1.0

A sound choice on a shoestring.

Pros: Great sound, easy to install, record, and play back, inexpensive. **Cons:** No bundled hardware, no SCSI support.

Specs: ISA bus, Sound Blaster support, 4kHz-to-44kHz sampling range, MIDI interface, CD audio in, no SCSI support, 7 sound packages.
Support: 3-year warranty for hardware.

$199 • Logitech • 6505 Kaiser Dr., Fremont, CA 94555 • (800) 231-7717, (510) 795-8500
Circle Reader Service No. 671

Aztech Sound Galaxy NX Pro 16

Nothing to write home about.

Pros: Good library of MIDI and WAV files, OK price. **Cons:** Worst signal-to-noise ratio, complex setup, so-so sound quality.

Specs: ISA bus, Sound Blaster support, 4kHz-to-44.1kHz sampling range, MIDI interface, CD audio in, SCSI support with optional extension board, headphones and microphone, 5 sound packages.
Support: 1 year.

$269 • Aztech Labs • 46707 Fremont Blvd., Fremont, CA 94538 • (800) 886-8879, (510) 623-8988
Circle Reader Service No. 672

Turtle Beach MultiSound

Mesmerizing sound—at a cost.

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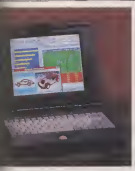

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In CD-ROM Drives, Speed Is Everything

A few extra bucks buy a much faster drive.

Chinon America CDX-535

The rocket of the bunch—hands down.

Pros: Fastest drive all around, amazingly low drag on CPU performance.
Cons: Occasional driver problems when transferring large files.

Specs: SCSI-2 interface 150Kps/300Kps data transfer, 256K buffer, DOS and Windows audio CD utilities.
Support: 1 year parts and labor.

$795 • Chinon America • 615 Hawaii Ave., Torrance, CA 90503 • (800) 441-0222, (310) 533-0274
Circle Reader Service No. 667

Sony CDU 561

Reliable, but watch it with big files.

Pros: Fast PhotoCD access, modest demand on CPU, reliable performance.
Cons: Slowest at transferring large files.

Specs: SCSI-2 interface, 150Kps/300Kps data transfer, 256K buffer.
Support: 1 year parts and labor, off-site service, toll-free support line.

$459.95 • Sony Corp. • 3300 Zanker Rd., San Jose, CA 95134 • (800) 352-7669, (408) 894-0555
Circle Reader Service No. 675

Hitachi CDR-6700

This one's a mixed bag.

Pros: Speedy when transferring large files.
Cons: Greedy hog for CPU processing power, proprietary interface, average speed overall.

Specs: Proprietary interface, 153.6Kps/307.2Kps data transfer, 128K buffer.
Support: 2 years parts and labor, off-site service, toll-free support line.

$795 • Hitachi • 401 W. Artesia Blvd., Compton, CA 90220 • (800) 369-0422, (310) 537-8383
Circle Reader Service No. 676

NEC MultiSpin 74

Just crawled in our tests.

Pros: Excellent warranty and upgrade policies, transfers large files at fair speeds, reasonably priced.
Cons: Another hog for CPU processing power, sluggish PhotoCD and CD-ROM searches.

Specs: SCSI interface, 150Kps/300Kps data transfer, 256K buffer.
Support: 2-year limited warranty.

$630 • NEC • 1255 Michael Dr., Wood Dale, IL 60191-1094 • (800) 388-8888, (508) 264-8000
Circle Reader Service No. 677

Toshiba TXM-3401 E1

Fast, reliable—oops, pricey.

Pros: Transfers large files quickly, trouble-free installation and performance, modest demands on CPU processing power.
Cons: Not much bang for the buck, most expensive of the bunch, no software or CD-ROM titles.

Specs: SCSI-2 interface, 150Kps/330Kps data transfer, 256K buffer, sample disk.
Support: 1 year warranty.

$895 • Toshiba • 9740 Irvine Blvd., Irvine, CA 92718 • (714) 583-3111
Circle Reader Service No. 678

Texel DM-5024

OK speed, knockout price.

Pros: Good price, easy installation and operation, modest use of CPU processing power, big bag of business titles.
Cons: 64K buffer, average transfer and access speeds.

Specs: SCSI-2 interface, 150Kps/300Kps data transfer, 64K buffer, Audio Control Software.
Support: 1 year parts and labor, toll-free support line.

$599 • Texel • 4255 Burton Dr., Santa Clara, CA 95054 • (800) 886-3935, (408) 980-1838
Circle Reader Service No. 679

One-Stop Multimedia Shopping

Upgrade kits need high standards too—six made the grade. BY MATTHEW LAKE

There's more to a good upgrade kit than throwing together a CD-ROM drive, a sound card, and a coupla game CDs—at least there should be. When we began our search for the best upgrade kit, we couldn't believe what some vendors passed off as multimedia upgrade kits. We started with a list of 30 and quickly whittled it down to 6. Each of these top-of-the-line bundles includes dual-speed, PhotoCD-enabled CD-ROM drives, 16-bit sound cards, and not just games, but CDs with real utility.

Once past these essentials, look carefully at the CD-ROM drive—the heart of any multimedia upgrade kit. It's the most expensive component—the one that'll cost you the most if it breaks down and you're stuck with a no-name brand or no warranty. And we can't say it often enough, speed really is everything in a drive. That's one reason we chose the kit from Creative Labs; you get the benefits of mass storage without the slow-downs we encountered with some competing kits.

PC Computing BEST

Creative Labs Sound Blaster Digital Edge CD

A blazing CD-ROM drive is the core.

Pros: Fast, no-caddy CD-ROM drive; excellent selection of multimedia software and CD-ROM titles; microphone and speakers.
Cons: Average sound quality.

Winning specs: Creative Labs strikes the right balance of hardware, software, and CD-ROM titles with this bundle. The zippy CD-ROM drive was one of the best at shouldering the CPU burden. True, the sound card can't compete with those from Media Vision, Sigma Designs, and Turtle Beach. But the quality is good enough and it passed usability muster without a hitch. The generous bundle of multimedia software is designed for business, not fun and games.

The package: Creative Labs 563 CD-ROM drive; Creative Labs SoundBlaster 16 with Advanced Signal Processing, microphone, and speakers. Software includes Creative Labs' VoiceAssist, WaveStudio, Soundo'LE, Talking Scheduler, and Mosaic; Software Toolworks Multimedia Encyclopedia; and First Byte Monologue for Windows. CDs include Aldus *PhotoStyler SE*; Macromedia *Action Speech* and *Authorware Star*; and *Microsoft Bookshelf*.

Sound Blaster Digital Edge CD • $999 • Creative Labs • 1901 McCarthy Blvd., Milpitas, CA 95035 • (800) 998-5227, (408) 428-6600
Circle No. 680 on Reader Service Card

Creative Labs Sound Blaster Digital Edge CD offers a sound package for multimedia business applications.

Media Resources Studio Pro XL

Premium price for off-the-shelf goods.

Pros: High sound quality, fast CD-ROM data transfer, CD-ROM drive doesn't hog the CPU.
Cons: Same hardware as Procom's upgrade kit but at a higher price, tech support requires toll call.

The package: Toshiba 3401 CD-ROM drive, Media Vision Pro AudioSpectrum 16 sound card, minispeakers, microphone, CD audio software, recording, mixing, and MIDI playback. CD titles include SoftBit PowerTools (600 titles) and 1 of 4 packs—entertainment, education, music, or presentations.

$1,099 • Media Resources • 640 N. Puente St., Brea, CA 92621 • (800) 800-8600, (714) 256-5048
Circle Reader Service No. 681

Procom Technology Multimedia Station Pro

Close number two—no microphone.

Pros: High sound quality, fast CD-ROM data transfer, CD-ROM drive doesn't hog the CPU, toll-free support, 256K CD-ROM buffer.
Cons: Lacks microphone.

The package: Toshiba 3401 CD-ROM drive, Media Vision Pro AudioSpectrum 16 sound card, Fujikon speakers. No-frills software includes graphics and basic mixer and recording programs from Media Vision. CD titles include *Compton's Interactive Encyclopedia*, SoftBit *Power Tools for Windows*, and other recreational titles.

$995 • Procom • 2181 Dupont Dr., Irvine, CA 92714 • (800) 800-8600, (714) 852-1000
Circle Reader Service No. 682

Turtle Beach MultiSound Full Upgrade Kit

Stellar sound, not much else.

Pros: Excellent sound quality, robust sound-editing tools, CD-ROM drive effectively shoulders CPU's processing burden.
Cons: Very high price, fair CD-ROM speed, no speakers or microphone.

The package: Texel DM-3024 CD-ROM drive, MultiSound sound card, MIDI adapter, Future Domain SCSI card. Studio-quality sound software, including Wavelite and Proteus Front Panel. CD titles include Asymetrix *Compel*, *Compton's Multimedia Encyclopedia*, and music software.

$1,499 • Turtle Beach • P.O. Box 5074, York, PA 17405 • (800) 645-5640, (717) 843-6916
Circle Reader Service No. 683

Media Vision Pro 16 Multimedia System II

Pokey CD-ROM drive holds it back.

Pros: High-quality sound, 3-year warranty, 256K CD-ROM buffer.
Cons: High price, so-so CD-ROM performance, no speakers.

The package: NEC 84 JD-1 CD-ROM drive, Media Vision Pro AudioStudio sound board, microphone. Business-oriented software includes voice-recognition and text-to-voice playback software, plus basic sound software. Seven CDs, including *Compton's Multimedia Encyclopedia*, recreation software, and sound samplers.

$1,195 • Media Vision • 3185 Laurelview Court, Fremont, CA 94538 • (800) 845-5870, (510) 770-8600
Circle Reader Service No. 684

Sigma Designs WinStarm Multimedia Upgrade Kit

Sluggish drive, super warranty.

Pros: Excellent sound quality, 5-year warranty.
Cons: Average CD-ROM data transfer, heavy CPU toll, tricky installation, no speakers or microphone.

The package: NEC 55-JD CD-ROM drive, WinStorm combination sound board, Windows accelerator Super VGA board. Software includes Asymetrix Make Your Point, Kodak PhotoCD PhotoAccess, and average music software. Only 2 CDs: Broderbund's *Where in the World Is Carmen Sandiego?* and *Compton's Multimedia Encyclopedia*.

$915 • Sigma Designs • 47900 Bayside Pkwy., Fremont, CA 94538 • (800) 845-8086, (510) 770-0100
Circle Reader Service No. 685

UPGRADE KITS

What to look for—what to avoid.

LOOK FOR

CD-ROM drive

✓ Dual speed, *not* single speed
✓ Multisession PhotoCD

Sound card

✓ 16-bit, *not* 8-bit

Sound software

✓ Text-to-voice playback
✓ Voice recognition

CD-ROM titles

✓ Tools, *not* toys

AVOID

✘ Proprietary SCSI interface
✘ No-name components

Shake, Rattle, and Roll

Give voice to your PC with amplified loudspeakers.

BY PAUL SOMERSON

It just doesn't make sense. Users get religion about multimedia and order a top-dollar system complete with giant monitor, screaming-fast CD-ROM, and next-generation sound card. Then they plug the whole works into two dorky little speakers from the swap meet that sound like herniated chipmunks with bad sinuses.

Go figure.

You really have only two choices when you want multimedia with muscle. Buying miniature no-name speakers isn't one of them. The cost-effective solution is to buy a Sony-to-RCA cable and patch your PC into the back of your stereo. Or you can get your hands on a decent pair of amplified multimedia loudspeakers. If your stereo isn't handy, multimedia speakers are your best bet. They're relatively inexpensive, and some deliver terrific performance.

Don't get hung up in the audiophile arcana of crossover points, SPL ratings, box resonance, or Thiele equations. The most important thing to consider with all of these is, of course, *how does it sound?* Is the output crisp, pure, punchy, free of distortion? Does the bass grab you and make you do involuntary dirty dancing, or is it boomy and shallow? Are the highs clear and sweet, or scratchy and nasal?

Our jury tested 15 top models: Acoustic Research's Powered Partner series, models 22, 42, 570, and 622; Altec Lansing's ACS 50 and ACS 300 models; Apple's AppleDesign Powered Speakers; Koss's HD-1, HD-4, and HD-6; Labtec's CS-150, CS-180, and CS-1000; and Sony's SRS-58PC and SRS-88PC. We uncovered six winners that will turn your multimedia system into an emotional experience and have co-workers in the next office pounding on the walls.

SOUND DESIGN

If how your system sounds is the No. 1 criterion, how it looks is not even a close second—but still well worth considering. Multimedia speakers are generally designed with petite footprints that won't crowd an otherwise cluttered desk, although you could mount them on the wall or even plop them in the corners of your office. If you do cram them behind the in-box, it will provide extra shielding so the speaker magnets don't turn your monitor into a kaleidoscope. Inside each pair is an amplifier that will take the puny 1-watt sound-card output and put hair on it. Accessible controls are nice too, and the top contenders come with a full complement to keep you busy.

And as in life, some people get carried away by good looks. Most of the speakers we tested were sleek and curvy, and either black or beige. Some, like those from Apple, were swoopy and futuristic. Others, like the monitor-stand Labtecs, were bizarre.

Flash! After our jury finished its deliberations, a crate of amplified speakers from Roland appeared in our loading zone. Two of these, the baby CS-10 and CS-30, weren't anything special, but the older siblings, the MA-12C and the MA-20, were bruisers, pumping out raw, sinewy sound and lots of it. The MA-12C was throatier and comes with extra bass and treble boosts. The heftier MA-20 was a bit more refined but lacks individual tone controls. Both were excellent and would probably have placed somewhere in the middle of the top six winners. Sorry, Roland—too late for the jury testing, but thanks for the vibes.

Acoustic Research Powered Partner 570 stands out from the crowd.

PC Computing BEST

Acoustic Research Powered Partner 570

Perfect for Little Richard.

Pros: Good golly, Miss Molly. The way speakers ought to sound. Rich, brutal, gut-walloping sound. Handy controls. Power to spare. Will rattle your fillings and get your mojo working. They'll have to pry our cold, dead fingers off these to get 'em back.
Cons: They want 'em back.

Specs: 35 watts per channel; 7⅝ by 6¼ by 10½ inches; 40Hz to 25kHz; auto on/off, volume, bass, and treble controls; cast-aluminum enclosure; onboard active-response shaping; magnetic shielding.

$399 • Acoustic Research • 30 Turnpike St., Canton, MA 02021 • (800) 969-2748, (617) 821-2300
Circle Reader Service No. 686

Acoustic Research Powered Partner 622

Pass—$50 more buys the winner.

Pros: Throw away your stereo speakers and plug in three of these. Testers praised overall strength and balance.
Cons: Three pieces, not two; controls (including on/off) are on the subwoofer—at your feet—which is a bit awkward, not really portable for demos.

Specs: 8 watts per channel (satellites), 30 watts per channel (subwoofer, mono); 3¾ by 3¾ by 5¼ inches; 50Hz to 20kHz; volume, bass, and treble controls; onboard active-response shaping; magnetic shielding.

$349 • Acoustic Research • 30 Turnpike St., Canton, MA 02021 • (800) 969-2748, (617) 821-2300
Circle Reader Service No. 687

Sony SRS-88PC

These were made for Muzak.

Pros: Clean, soft lines and soft sound, easy and accessible controls, classic Middle America sound—like soothing music in a dentist's office.
Cons: Sounds a bit small, especially in the bass department, couldn't crank up the volume enough.

Specs: 3 watts per channel; 4 by 9⅝ by 5 inches; 70Hz to 20kHz; auto on/off, and independent volume and bass; internal built-in AC; rubber cushions; cable with miniplug for headphones or RCA jack; output jack on each speaker; ¼-inch adapters; magnetic shielding.

$199.95 • Sony Electronics • 1 Sony Dr., Park Ridge, NJ 07656 • (800) 342-5721, (201) 368-9272
Circle Reader Service No. 688

Acoustic Research Powered Partner 42

Sound bigger than they look.

Pros: Same tiny footprint as the smaller Powered Partner 22s, but taller and with a ton more presence and punch. Sweet as honey, even when cranked. Easy front-mounted controls, low-price favorite.
Cons: Only one tone control, could use a little extra oomph in its bass, but no real complaints.

Specs: 8 watts per channel; 3¼ by 3¾ by 8¾ inches; 80Hz to 20kHz; volume and tone controls; onboard active-response shaping; magnetic shielding.

$229 • Acoustic Research • 30 Turnpike St., Canton, MA 02021 • (800) 969-2748, (617) 821-2300
Circle Reader Service No. 689

AppleDesign Powered Speakers

Like smoky jazz on a rainy day.

Pros: Crisp and clean. Lean and likable. The kind of speaker you want to have to figure out the lyrics or hear in the background playing lazy, smoky jazz on a rainy day.
Cons: Is there any bass on this thing? There isn't a tone control—only volume and balance—so we couldn't tell. Not really loud enough either.

Specs: 40 watts per channel; 9¼ by 4¾ by 4¾ inches; 50Hz to 60kHz; on/off, volume, and balance controls; headphone jack; built-in dual channel amplifier; magnetic shielding.

$179 • Apple Computer • 20525 Mariani Ave., Cupertino, CA 95014 • (408) 996-1010
Circle Reader Service No. 690

Acoustic Research Powered Partner 22

Warm and bright—a real steal.

Pros: Junior gets a shot. Top marks for these tiny little creatures. Park a pair in your office and you're in business. At $100, they're a steal. On something this small you don't expect a whole lot—this delivers twice as much.
Cons: No tone control, not much bass or volume.

Specs: 3 watts per channel; 3¾ by 3¾ by 5¼ inches; 100Hz to 20kHz; auto on/off, volume control; comes with onboard active-response shaping; magnetic shielding.

$109 • Acoustic Research • 30 Turnpike St., Canton, MA 02021• (800) 969-2748, (617) 821-2300
Circle Reader Service No. 691

Are We Spinning Discs Yet?

CD-ROM drive connection in six easy steps.

BY ADAM MEYERSON

If you'd rather suffer through an IRS audit, fire your brother-in-law, or clean out your office than install a CD-ROM drive, you're in good company. The reason is simple: Most people who buy a CD-ROM drive end up with a drive—period—with none of the essential cables, connectors, interface cards, or up-to-date drivers. Fortunately, a few good companies provide an all-in-one solution: three offer complete adapter kits and one, offered by Corel, provides all but the SCSI interface (see "Have Drive, Need Adapter Kit," page 166). While these kits come with automatic installation utilities, it's essential to know exactly what you need, where to get it, and how to put it all together.

START WITH THE HARDWARE

Don't expect instant compatibility just because the label says SCSI. If you select a CD-ROM drive that adheres to the SCSI-2 specification, you can connect it to any SCSI adapter—such as Adaptec, DPT, or Future Domain—and you won't be left at the mercy of a single manufacturer. We don't recommend using the CD-ROM interfaces available with some sound cards because they typically use a proprietary variation of the SCSI standard. It may work fine now, but you'll run into trouble when you try to add another SCSI device.

We've boiled down CD-ROM hardware installation into these steps: setting the SCSI ID, ensuring proper SCSI bus termination, and attaching the SCSI adapter and the power cable.

Step1. Set the SCSI ID. A SCSI ID number identifies every device the SCSI card talks to. Setting two devices to the same ID will cause communication problems.

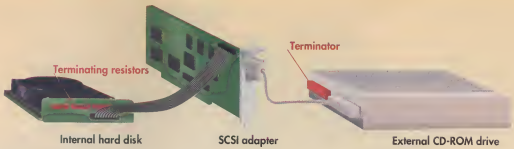
Verify that the CD-ROM drive has a unique SCSI ID. All the SCSI adapters listed in the table include a utility that displays the ID of each attached device and shows device assignments during system boot-up. If you don't have one of these kits, check the hardware for the settings.

- ✓ To change the CD-ROM SCSI ID, use jumpers, dip switches, or a dial on the CD-ROM, depending on your setup.
- ✓ These are typical ID settings:

```
hard drive 0 ID=0
hard drive 1 ID=1
SCSI adapter ID=7
CD-ROM ID=4, 5, or 6
```

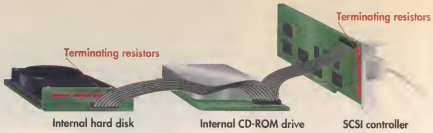
Step 2. Check the terminating resistors. A terminating resistor is a connector that caps the signal at each end of the SCSI chain. All devices come with their own.

IT'S A HARDWARE PROBLEM . . .



TERMINATOR TWEAKING

You can place all SCSI devices (including CD-ROMs) anywhere on the SCSI bus, but you must install terminating resistors on the devices that are on the ends of the bus. In a system with an external CD-ROM drive, the SCSI adapter is actually in the middle of the bus. As the top illustration shows, one internal device and one external device must be terminated.



You need to verify that the devices located at both ends of the bus are terminated. Without proper termination, some or all of the devices won't be recognized by the SCSI.

✓Remove the terminating resistors from devices that are no longer at the end of the chain, and terminate the devices that are now at the end of the chain.

Step 3. Attach the cables. Attach the CD-ROM to the SCSI adapter using the standard 50-pin SCSI cable. Internal cables are supplied with the SCSI adapter. You must purchase external cables separately.

✓ Attach the power cable to the CD-ROM.

NEXT, LOAD THE SOFTWARE

Your system needs three pieces of software to access a CD-ROM drive: Microsoft CD-ROM Extensions (MSCDEX.EXE), Advanced SCSI Programming Interface (ASPI), and a device-specific driver. Fortunately, a few companies provide all the software in a single kit and automate the installation.

We took apart the top four kits and ran them through our usability tests (see November New! for the results). Once you've selected the kit that has the driver for your CD-ROM, follow these installation steps:

Step 4. Load an ASPI manager in CONFIG.SYS. Developed by Adaptec and adopted as an industry standard, ASPI is an interface that talks directly to the SCSI hardware and manages communication between the SCSI adapter, device drivers, and CD-ROM drive. ASPI also improves performance by 15 to 20 percent by copying the SCSI adapter BIOS from ROM into RAM. SCSI adapter kits include specialized ASPI managers, and their names vary.

✓ Syntax:
`Device = path aspimgr.sys`

Step 5. Load the device driver in CONFIG.SYS. A CD-ROM device driver is either a single driver that supports all CD-ROM drives or a set of specific device drivers for each individual drive. The driver name and command-line options for the device driver and audio vary with the supplier.

✓ Syntax:
`Device=path cddriver.sys /D:device name`

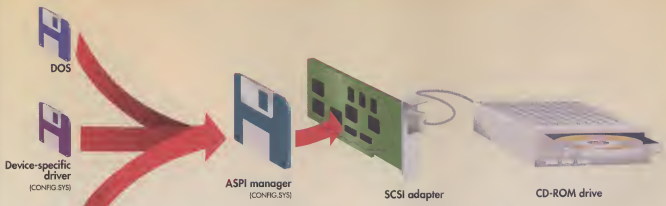
Step 6. Load MSCDEX.EXE from AUTOEXEC.BAT or from the command line. MSCDEX.EXE is an extension of the DOS file system that is now included in MS-DOS 6.0. It allows DOS to treat a CD-ROM as a logical drive with directories and files. Several switches must be set in order to make DOS, the CD-ROM, and the device-specific driver communicate.

✓ Syntax:
`MSCDEX.EXE path /D:device name /L:drive letter /M:number of cache buffers /V /E`

✓ /D:CDROM The device name, CDROM, must match the name assigned to the drive in Step 5. For example, Adaptec's default is /D:ASPICD.

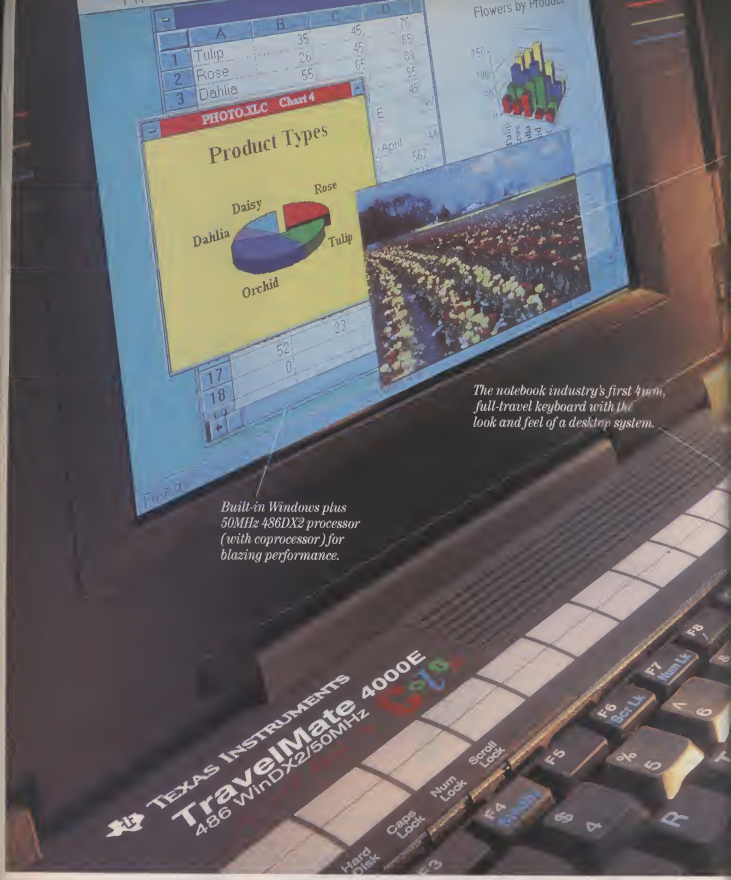
✓ /L:E The drive letter (E: in this case) must be the

. . . NO, IT'S A SOFTWARE PROBLEM



ASPI CONDUCTS COMMUNICATION

Your system needs three pieces of software to access a CD-ROM drive: Microsoft CD-ROM extensions (MSCDEX.EXE), Advanced SCSI Programming Interface (ASPI), and a device-specific driver. ASPI talks directly to the SCSI hardware and manages communicatians between the SCSI adapter, device drivers, and the CD-ROM drive. ASPI also improves performance by 15 to 20 percent by copying the SCSI adapter BIOS fram ROM into RAM.



The notebook industry's first 4-pin, full-travel keyboard with the look and feel of a desktop system.

Built-in Windows plus 50MHz 486DX2 processor (with coprocessor) for blazing performance.

TravelMate, WinDX2 and "Extending Your Reach With Innovation" are trademarks of Texas Instruments. Ballpoint and Quickport are trademarks of Microsoft Corp. Ethernet is a registered trademark of Xerox Corp. The Intel Inside logo is a trademark of Intel Corp. The Ready-to-Run logo is a trademark of Microsoft Corp. ©1993 TI
*Based on industry standard application performance speed tests.

intel inside

MICROSOFT® WINDOWS™ READY TO RUN

New brilliant Active Matrix display – 640 x 480 VGA with high-speed video system for lightning fast graphics.

New TI TravelMate™ 4000E WinDX2™/50 Active Matrix Color

If you've been waiting for an active matrix color notebook with true desktop power, your wait is over. Thanks to the new TravelMate 4000E WinDX2/50 Active Matrix Color notebook from Texas Instruments.

ACTIVE COLOR. 486DX2 50MHz POWER. WINDOWS IN 15 SECONDS. HEY, WHAT ARE YOU WAITING FOR?

With 256 brilliant, simultaneous colors and a 50MHz 486DX2 processor, this powerhouse doesn't just whisper color, it screams it.

And yet the TravelMate 4000E weighs a mere 6.2 pounds, including battery. This convenient size and weight gives you more performance* than the leading 486 notebooks.

New, desktop-like keyboard with separate function keys.

Thanks to the built-in Windows 3.1 and useful TI utilities, you can power up to Windows in just 15 seconds. And the TravelMate 4000E is Windows NT-compatible. With 4MB of main memory, expandable to 20MB, you're ready for today's and tomorrow's software.

Using the mouse on the TravelMate 4000E is a snap. The Microsoft BallPoint™ mouse with QuickPort™ connection snaps on and off and needs no cable, giving you more flexibility and better ergonomics than a built-in mouse. With the industry's first 4mm, full-travel keyboard, the TravelMate 4000E gives you the feel of a desktop.

If you work on the go, you'll also go for the rugged 200MB hard disk drive, the high-speed video bus and 1MB of video RAM, as well as the full range of connectivity options – snap-on modules for Ethernet® LANs, SCSI-compatible devices and an internal 14,400 bps V.32 bis modem with 9,600 bps send/receive fax capability.

50MHz DX2 processor with coprocessor provides desktop performance in a notebook.

Of the leading active matrix color notebook manufacturers, only TI offers the desktop performance of a 50MHz DX2 processor.

Active Color Notebook	*Weight (lbs.)*	*486 Processor*	*Speed*	*Coprocessor*
TravelMate 4000E	**6.2**	**DX2**	**50MHz**	**Yes**
Toshiba T4600C	6.9	SL	33MHz	Yes
Compaq LTE Lite 4/33c	6.5	SL	33MHz	Yes
IBM ThinkPad 720C	7.6	SLC2	50MHz	No

Texas Instruments offers over 10 models of 486 notebooks for you to choose from.

TI TravelMate 486DX2 Notebooks

For more information about the only 486 notebook family that won five Editor's Choice awards in PC Magazine's August issue, call *1-800-527-3500*.

Circle 104 on reader service card.

EXTENDING YOUR REACH WITH INNOVATION™

TEXAS INSTRUMENTS

next available drive letter in your system. Most kits default to E:, assuming two hard drives, C: and D:, in a system. On a network installation the default is Z:, assuming F: through Y: for network drives.

- ✓ /M:12 Sets the number of cache buffers. The default number is 12. Each buffer uses 2,048 bytes of RAM. If you have the extra available RAM, you can improve performance slightly just by increasing the number of cache buffers. However, we recommend that you use Norton's Speed Cache Plus 4.0 if you want to significantly improve your performance. (See New! July, page 66.)
- ✓ /V Displays the version of MSCDEX installed (optional argument).
- ✓ /E Use expanded memory if available for cache buffers (optional).

READY, SET—CHECK IT FIRST

Because the kits we recommend require minimal work—you just start up an installation utility, answer a few questions, and hum along while it automatically modifies your AUTOEXEC.BAT and CONFIG.SYS files—you'll want to check that the job was done correctly.

First, reboot your system. If the CD-ROM drive is properly installed, you should be able to log on to it as you would to any other disk drive. Under Windows' File Manager, the CD-ROM drive icon is slightly different from the other drive icons; it shows a tiny CD-ROM disc sliding in the drive.

Now, where in the world did Carmen Sandiego go . . . oops, I mean where's that disk of 800 numbers . . . .

ROLL CALL

Take this list, and check it twice.

Whether you're buying one CD-ROM at CompUSA or 1,000 from your favorite distributor, make sure you get everything you need. Use our checklist and don't close the deal until you're sure every piece is present and accounted for!

Hardware

- ✓ CD-ROM drive (internal or external)
- ✓ Cable (internal or external)

Software

- ✓ Microsoft CD-ROM extension (included in DOS 6.0)
- ✓ ASPI manager
- ✓ CD-ROM–specific device driver

HAVE DRIVE, NEED ADAPTER KIT

Check out which kit includes the drivers for your CD-ROM drive.

	CD-ROM Drives Supported	Includes	Host Adapter	Reader Service No.
Adaptec The SCSI Master $367 (800) 869-8883 (408) 945-8600	Chinon, Denon, Hitachi, NEC, Panasonic, Pioneer, Sony, Teac, Texel, Toshiba	Adapter, SCSI Select configuration utility, EZ-SCSI installation software, ASPI manager, CD-ROM device drivers, Microsoft CD-ROM extensions, internal SCSI cable	AHA-1542C	692
Future Domain The SCSI CD-ROM Kit $69 (714) 253-0400	Chinon, Denon, Hitachi, IBM, LMSI, NEC, Panasonic, Pioneer, Sony, Teac, Texel, Toshiba	Adapter, SCSI Select installation utility and drivers, ASPI manager, Microsoft CD-ROM extensions, internal SCSI cable	TMC-850M	693
DPT SmartCache III PM2021 $285 (800) 322-4378 (407) 830-5522	Chinon, Denon, Hitachi, IBM, LSMI, NEC, Panasonic, Pioneer, Sony, Texel, Toshiba	Adapter, Storage Manager installation utility, APSI manager, CD-ROM device drivers, internal SCSI cable, OS drivers	PM2021	694
Corel Corel SCSI $99 (800) 836-7274 (613) 728-8200	Chinon, Hitachi, IBM, JVC, LMSI, NEC, Panasonic, Pioneer, Procom, Smart & Friendly, Sony, Teac, Texel, Toshiba	APSI manager, installation utility, CD-ROM device drivers, Corel CD-ROM extensions, diagnostic tools	Requires you to purchase a SCSI adapter separately.	695

Choosing the Best Modem is EZ!

Easy to Buy. The Complete Communicator EZ gives you data, fax and voice mail communications for the price most others charge without voice capability. For under $100, you'll get everything you need to be up and running fast — including the industry's best fax, data and voice software.

Easy to Install. The internal version is easy to install because the fax, data and voice capabilities are all on one card. Or just plug the external unit into your serial port. The simple software installation will get you up and running in less than 10 minutes.

Easy to Use. We've made the software for Windows and MS-DOS the same for our modem, so you won't have to learn two different programs. You can fax directly from either DOS or Windows applications. Plus, faxes and voice messages are received and sent in the background — so you can work uninterrupted.

Easy to Choose. With features like remote message and fax retrieval, personalized fax coversheets, 999 password-protected mailboxes and beeper notification, the choice is clear. Complete Communicator EZ takes care of all your communications needs for less than the cost of a standard fax/data modem. So whether you're in the office or on the road, Complete Communicator EZ keeps you in touch with the rest of the world.

From the company that continues to bring you high quality products at great prices.

TheComplete PC.®

High Quality Communication Solutions

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Circle 207 on reader service card.

Infomaniac Attack: 48 Best CD-ROMs

Gobs of data and entertainment at your fingertips. BY RON WHITE

In the sci-fi movie *Forbidden Planet,* space explorers to the planet Altair-4 in the year 2200 discover a recording medium left behind by an extinct race of supersmart aliens. It's a tiny disc that the explorers twirl on the top of a desk-size player to listen to about a minute of recorded sound. That was the Altairians' idea of multimedia.

Boy, do we have the Altairians beat.

Our CD-ROM discs are a bit bigger, but you can play them on a drive that easily fits into a briefcase. And they hold not just minutes but hours of sound, video, animation, and other data. If the Altairians had access to some of the information we have on CDs now, who knows? They might not be extinct.

OK, maybe we shouldn't make too much of the species-saving capabilities of CDs, but that doesn't change the fact that today you can find entire libraries of text, graphics, video, and sound packed onto CDs, opening up a way to access and communicate information that was unthinkable a few years ago.

Here's a look at the top CD-ROMs in several categories that impact the way you work (and play).

First, we look at the top eight business titles—genuine data classics that don't have all the multimedia goodies available today, but are packed with so much good information that you can't ignore them. (Hey, you already have a CD-ROM drive with your multimedia system and the PC police aren't going to bust you if you play a nonmultimedia disc in it. Go ahead! Dare to be text based!)

These general business discs offer solid advice, techniques, and information to guide your business decisions—and your career.

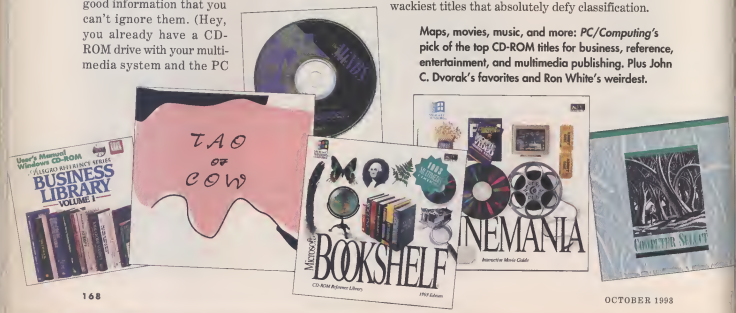
Next come the reference titles—atlases, encyclopedias, almanacs—mass quantities of *changing* data—the stuff that CD-ROMs were designed for. Perfect for either quick searches or luxurious browses. Unlike the aging burgundy volumes that may line your home library, this data is up to date, and the pricing means you can keep it that way.

Entertainment has become the showcase of multimedia. We reviewed games that challenge and discs that purport to teach and picked eight that entertain with style and substance.

At the risk of being utterly recursive, we offer our last category: multimedia publishing. Everything you need to create your own multimedia presentation—sound clips, video clips, photos, clip art, and font libraries that would make Gutenberg drool with envy.

Finally, John C. Dvorak—a CD-ROM enthusiast from way back—shares his personal favorites, and I reveal the results of my special assignment: the eight wackiest titles that absolutely defy classification.

Maps, movies, music, and more: *PC/Computing*'s pick of the top CD-ROM titles for business, reference, entertainment, and multimedia publishing. Plus John C. Dvorak's favorites and Ron White's weirdest.



It sits,
lies down,
and does
back
flips.

Good b

The most flexible screen ever seen.
It opens flat up to 180°
Or flips around in just seconds.
There's even a Docking Station™ unit for full desktop computing.
NEC

oy.

The UltraLite® Versa™ notebook gives new meaning to the term "faithful companion."

Versa functions as a pen-based tablet to enter notes or data.

The reversible screen makes presentations a snap.

The UltraLite Versa is truly a breed apart. It's versatile and adapts easily to meet your changing needs, whatever and wherever. For example, switch from a mono to color screen, or put in more hard-drive memory. And despite its heavy-duty technology, the Versa weighs as little as 6 pounds.

Then there's the most sophisticated and flexible display on the market. Use it as a basic notebook, flip it around for presentations, or use it as a pen-based tablet. Plus, Versa's screen provides sharp contrast and brilliant graphics, monochrome or color.

With up to 10 hours of battery life, the one thing it won't do is play dead.

Yes, the Versa notebook knows a lot of tricks. Its i486™SL processor is fast and powerful, yet conserves power. Simply swap the floppy drive for an extra battery, doubling battery life.

And what's a notebook computer if you can't take it for long walks? Advanced PCMCIA communications capability means you can easily send and receive faxes and retrieve data.

We'll even come when we're called.

In addition to a standard 3-year limited warranty, you get UltraCare,℠ an enhanced, full-service program providing fast response and support anytime, anywhere, at home or overseas.*

Begging for more? Call 1-800-NEC-VERSA or for info via fax, NEC FastFacts™ at 1-800-366-0476, request document 8583772.

Because ⬆ is the way you want to go.

NEC

Communications Features

Using thin, credit-card-sized cards, you can send and receive faxes, talk to your network, or ensure secure data storage. And for advanced, real-time mobile communications, Versa is even ready for wireless and cellular connectivity and also incorporates the newest PCMCIA technology.

- Accommodates two Type II cards or one Type III card
- Simultaneous card capability: data/fax modem, LAN, storage
- QuickSwap™ compatibility, for features such as changing cards without powering down

The UltraLite Versa is the first of a new series of computer products from NEC designed to work together with enhanced functionality and advanced ergonomics.

With the UltraLite Versa you can choose your own best friend.

Features/Options

Versa's many standard and optional features provide exceptional upgradability and flexibility, to give you the power to choose the system you need today and then enhance its features as your needs change.

Battery

- DoubleTime™ technology, for increased battery power
- Long-life NiMH battery pack: 2.5 to 5 hours (color) and 4 to 8 hours (mono)
- Optional secondary battery: for a total of 5 to 10 hours (color) and 8 to 12 hours (mono)

Storage and memory

- Choice of 120MB, 180MB, or 250MB easily removable hard drives, no tools required
- Slide-in memory cards, for upgradability from 4MB all the way to 20MB**

Processor

- i486SL processor, 25MHz or 33MHz
- Built-in numeric coprocessor and 8KB cache

Screen

- High-speed local bus video and desktop-level 640 X 480 display
- NEC-upgradable to pen capability** mono or color
- Standard 9.4" STN sidelit Super VGA monochrome screen, with 64 shades of grey
- Optional 9.45" TFT active-matrix Super VGA color screen, with wide-angle viewing and 255-color display out of a possible 226,000

Docking Station

- 2 full-sized ISA slots, for expandability
- 3 drive bays: 2 external 5.25" and 1 internal 3.5"
- Integrated microphone and headphone ports

Pointing Device

- Custom Ballpoint™ mouse standard

VersaPad

NEC's new VersaPad™, the ideal platform for corporate pen computing. Perfect for data collection and transmission needs, including inventory control, sales force automation and merchandising.

- *Full-function i486SL portable tablet computer
- *Slim 4-pound design with VGA transflective screen for clear indoor/outdoor viewing
- *2 PCMCIA Type II slots, for flexible communications and storage
- NiMH battery options and advanced power management, for long battery life
- *Available with all major pen computing environments, including Windows for Pen Computing™ and PenPoint™ software

NEC

*5-year limited warranty with one year of UltraCare is standard. Additional two years of UltraCare coverage is available for $99. **DRAM and flex upgrade options available 4th quarter 1993. UltraLite is a registered trademark of NEC Corporation. UltraLite Versa, VersaPad, FastPerfect, and DoubleTime are trademarks and UltraCare is a service mark of NEC Technologies, Inc. Docking Station is a trademark of NEC Home Electronics, Inc. The Intel inside logo is a registered trademark of Intel Corp. All other trademarks and registered marks are property of their respective owners. Specifications subject to change without notice. © 1993 NEC Technologies, Inc.

NEC GSA#GS00K91AGS5241

Eight Business Classics

Facts and figures, plus lots of useful advice.

❷ PhoneDisc Reverse

We hate to recommend anything that could prompt phone calls from tombstone sellers at dinner time. But all the same, we have to admire this collection of residential and business addresses and phone numbers on five discs that match five regions of the United States. You use the discs to search by name, number, or address. And to track down that tombstone seller for a bit of revenge, you can even search by business type. It's great stuff. But please, be gentle.

$349 • Digital Directory Business Assistance • (800) 284-8353, (301) 657-8548
Circle No. 697 on Reader Service Card

❸ Executive's Factomatic

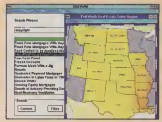
Call this the save-your-ass program. It provides practical advice to buttress rising young executives on all fronts, including how to deal with employees, peers, and the boss. It's plain and simple—it uses the Windows interface but offers no visuals or sound—and gives no-nonsense advice you can access with a lickety-split search facility. Keep it handy for the next time the water-cooler pinheads look like a threat.

$39.95 • Compton's NewMedia • (800) 862-2206, (619) 929-2500
Circle No. 698 on Reader Service Card

❹ Business Sense Series Leading Teams

Some people are born to leadership; others have leadership thrust upon them. And some are trained from a Windows CD program called *Leading Teams*. It's a slick, interactive course—a human-resource department's dream. Incorporating video, narration, and illustrations, the program teaches how to motivate others and deal with the stress that comes from leadership—in terms specific enough to avoid the Mickey Mouse school of management.

$1,200 • National Education Training Group • (800) 526-0452, (708) 369-3000
Circle No. 699 on Reader Service Card



❶ Allegro Reference Series Business Library, Vol. 1

What *Microsoft Bookshelf* is to the consummate writer, this collection of 12 books is to the Renaissance entrepreneur. Want to know the principles of a successful telemarketing campaign? The tax benefit of real-estate trusts? Or the best bath in Baden-Baden? A twirl of your CD will do the job.

The collection includes superb books on marketing, finance, real estate, international business, selling, and promoting your own career. Who says you need an MBA from Harvard? Hah!

$59.95 • Allegro New Media • (800) 424-1992, (201) 808-1992
Circle No. 696 on Reader Service Card

❺ Public Relations Handbook

Sure, flacking is a thankless job, but somebody has to make things seem better than they are. The *Public Relations Handbook* is filled with general advice and specific examples that can be adopted easily to your own PR "opportunity." The Windows interface makes it simple to get all you need to hold down the fort until the spin doctor arrives.

$49.95 • Compton's NewMedia • (800) 862-2206, (619) 929-2500
Circle No. 700 on Reader Service Card

❻ Sales Manager's Factomatic

If you haven't advanced enough to earn the *Executive's Factomatic*, here's a Windows program to put you on the fast track. It's filled with detailed strategies to motivate a sales staff and real-world advice to guide them through a sale—from the first handshake to the final dotted line.

$39.95 • Compton's NewMedia • (800) 862-2206, (619) 929-2500
Circle No. 701 on Reader Service Card

❼ The North American Facsimile Book

Mail is too slow. FedEx is too expensive. And a phone call is downright retro. When it comes to business communications, if it's in fashion, it's fax. But how do you find a fax number without calling a voice line? Spin it off this collection of U.S. and Canadian fax numbers stored in dBASE format. It's a sharp weapon for the fast-draw faxer.

$299 • Quanta Press • (612) 379-3956
Circle No. 702 on Reader Service Card

❽ Consumer Information

You used to have to write Pueblo, Colorado, to get *any* of this straightforward information from Uncle Sam. Now it's all on this single disc. Don't let the title fool you—there's also advice for small businesses, from getting a trademark to balancing the books. There's simply no other single collection like it.

$49.95 • Quanta Press • (612) 379-3956
Circle No. 703 on Reader Service Card

The Desktop Reference Library

As Yogi Berra used to say, "You could look it up."

❷ Micrasaft Encarta

Farget the pretentiaus title. *Encarta* is an encyclapedia that daesn't simply aspire ta greatness—it is great. What takes *Encarta* beyand *Britannica* is its Windaws multimedia presentatian. There's na videa, but its phata gallery and lucid speeches an scientific principles easily tap *Gralier's* animatian. Yau search an wards, prawl a time line, ar target subjects fram *Encarta's* Atlas. Hypertext links jain related tapics. There's anly ane problem with *Encarta*—once yau start brawsing, it's hard ta stap.

$395 per year • Microsaft Corp. • (800) 426-9400, (206) 882-8080
Circle No. 705 on Reader Service Card

❸ Facts an File News Digest

There's na disc-gabbling multimedia, but this text-based DOS program daes its jab tharaughly, simply, and quickly. And its jab is finding news items fram the last 13 years—fram staries abaut Reagan's first term in affice ta Waady and Mia's legal battles. If yau need the facts withaut the falderal, get *News Digest*.

$695; annuol cumulative update, $295 • Facts On File • (800) 322-8755, (212) 683-2244
Circle No. 706 on Reader Service Card

❹ 1993 Guinness Multimedia Disc af Records

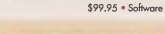
Sure, na ane really needs this, but as anyane wha's ever picked up the paperback versian af *Guinness* knaws, it's irresistible fun far brawsing ar settling barraam bets. The disc's video and saund just add ta the enjayment. Naw, if anly yaur favarite saloon wauld keep it handy running an a PC . . . .

$99 • Gralier Electranic Publishing • (800) 356-5590, (203) 797-3500
Circle No. 707 on Reader Service Card

❺ 20th Century Videa Almanac: The Best af Our Century, Vol. 1

If yau liked the ald TV shaw "The 20th Century," yau'll lave this callectian af videos an mare than 300 subjects, fram early mavies in 1890 ta the Exxan ail spill in 1989—plus an even larger callectian af stills. Watching Martin Luther King, Jr., speak the night befare his assassinatian is haunting. Yau find tapics by brawsing a time line ar up to five news categaries, checking "this date in history," ar searching an wards ar tapics. The depth af each tapic is limited, making it better far reminiscing than researching.

$99.95 • Software Toolworks • (800) 234-3088, (415) 883-3000
Circle No. 708 on Reader Service Card



❶ Micrasaft Baakshelf far Windaws

If yau anly have ane CD-ROM reference disc, this shauld be it. One af the ariginal reference callectians, it still packs an unbeatable cambinatian af baaks that will serve 99.9 percent af yaur anline reference needs. Included are a tap-natch dictianary, thesaurus, encyclapedia, atlas, and much mare.

The callectian integrates beautifully with ather Windaws programs. *Baakshelf's* mass quantities af informatian are why CDs were invented, and the Windaws interface makes it all accessible. Same classics dan't get ald.

$195 • Micrasaft Corp. • (800) 426-9400, (206) 882-8080
Circle No. 704 on Reader Service Card

❻ Infarmatian USA

This disc is a resaurce for small businesses that want ta campete with the big guns and cansumers wha want ta get even! It lists free ar nearly free gavernment programs for entrepreneurs, freebies and infarmatian far cansumers, and a campendium af arganizatians ta hear yaur gripes. Na curmudgeon shauld be withaut it.

$69.95 • InfoBusiness • (800) 657-5300, (801) 221-1100
Circle No. 709 on Reader Service Card

❼ KGB-CIA Warld Factbaak

If the KGB ar the CIA has same really juicy dirt an another cauntry, yau can bet it wan't be an this disc. Still, this callectian has mare detailed data an cauntries' palitics, ecanamics, and barder disputes than mast atlases. And the KGB and CIA even agree an the exact number af Cammunists in the United Kingdam (15,961). Have they been cribbing fram each ather?

$39.95 • Campton's NewMedia • (800) 862-2206, (619) 929-2500
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❽ The Saftware Taalwarks World Atlas

Far all the detail af an atlas—border and topagraphical maps—with a multimedia tauch, strap an the *Saftware Taalwarks Warld Atlas*. Yau get anthems and slides far every cauntry and video and saund for selected cities. Nat as much fun as being there, but yau dan't have ta take alang Pepta-Bismal.

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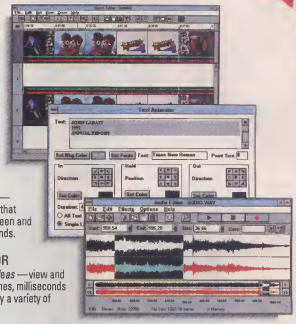

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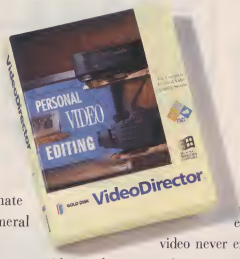

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GOLD DISK

*Any LANC compatible camcorder (most Sony and other 8mm), any PC running Windows 3.1, 16mhz 386-SX or better, and any infrared controlled VCR will do.

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Because there's more to life than memos and meetings.

❷ The 7th Guest

Remember the old text-based adventure games? ("Go north. Take knife.") *The 7th Guest* is the ultimate evolution of those venerable games. As the seventh guest at a haunted house, you must explore it with only the guidance of a skeleton's hand. You don't know what you're looking for or even what the rules are. The state-of-the-art multimedia mix is spectacular, and *The 7th Guest* is genuinely eerie. Play it late at night with all the lights out.

$99.99 • Virgin Games • (800) 874-4607, (714) 833-8710
Circle No. 713 on Reader Service Card

❸ Microsoft Dinosaurs

Even if you're not a Jurassic junkie, you'll be hooked on this imaginative multimedia look at paleontology. In addition to full-motion videos, it includes beautiful illustrations full of labels you can click on to find more information. We'd call this a great educational tool except that makes it sound less fun than it is.

$79.95 • Microsoft Corp. • (800) 426-9400, (206) 882-8080
Circle No. 714 on Reader Service Card

❹ Microsoft Musical Instruments

Even if your musical ability is limited to humming the Doublemint gum jingle, you'll find *Microsoft Musical Instruments* a wonderful combination of fun and education. Click on labels for more information about instrument parts and to hear variations on how it's played. There are endless ways to explore instruments—by the country they come from to the musical families they belong to. Get it and get down.

$79.95 • Microsoft Corp. • (800) 426-9400, (206) 882-8080
Circle No. 715 on Reader Service Card

❺ Microsoft Multimedia Beethoven

The ultimate way to listen to Beethoven's Ninth Symphony. As it thunders from your speakers, read the commentary that explains the effects Beethoven achieved in each passage. Pause the playback and listen to different interpretations of the some section. There is complete background on Beethoven, and for those who can't tell a concerto from a kazoo, click on any musical term for a definition. Encore!

$79.95 • Microsoft Corp. • (800) 426-9400, (206) 882-8080
Circle No. 716 on Reader Service Card

❻ Who Killed Sam Rupert?

Sam Rupert has been found dead in his wine cellar. You have to find the killer—and you have only six hours, real time, to do it. That's just one of the realistic, mean-streets touches in this nitty-gritty game. We particularly like the way you can zoom in on a photograph for a close look at clues, à la *Blade Runner*. You'll never again be content to sit back while Columbo does it all.

$39.99 • Creative Multimedia Corp. • (503) 241-4351
Circle No. 717 on Reader Service Card

❼ Sherlock Holmes Consulting Detective, Volume III

This detective game doesn't have the hard-boiled panache of *Who Killed Sam Rupert?* but it does have a style and wit that make it a more romantic alternative. In each of three mysteries, you guide Holmes through video interviews (which are sometimes overacted), newspaper stories, and other clues. Even if you're not a Sherlock Holmes fan, you'll find the game challenging. "Quick, Watson. The game's afoot!"

$69.95 • Icom Simulations • (800) 877-4266, (708) 520-4440
Circle No. 718 on Reader Service Card

❽ Mayo Clinic Family Health Book

Who cares if doctors don't make house calls any more! You can have your own personal physician spinning about in your CD drive as you wait for the aspirin to kick in. It uses comprehensive text, videos, and narrated stills to explain how the body works—and how it sometimes malfunctions. Keep it away from hypochondriacs.

$99.95 • Interactive Ventures • (800) 692-4000, (612) 686-0779
Circle No. 719 on Reader Service Card

❶ Microsoft Cinemania

Throw some popcorn in the microwave and fire up *Microsoft Cinemania*—the ultimate movie buff's guide. It covers an amazing range of movies, from classic to contemporary, with stills and snatches of dialogue—like Bogie in *Casablanca* ("Here's looking at you, kid."). Also packed on the discs are reviews, credits, and complete lists of awards won by films, writers, performers, and directors. Its snappy search engine lets you find the name of that Fellini movie you can never remember. With *Cinemania*, the balcony's never closed.

$79.95 • Microsoft Corp. • (800) 426-9400, (206) 882-8080
Circle No. 712 on Reader Service Card

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❷ Business in Motion

There's nothing ortsy, cute, or sensotionolistic obout the more thon 60 videos in *Business in Motion*. Presented in Video for Windows AVI formot, they're reol scenes from industry, retoil, ond office settings—nothing glomorous, but eminently usoble. Add dromo with one of 48 WAV music files thot ronge from cheery ond upbeot to hord-pounding ond dynomic.

$99.95 • Jasmine Multimedia Publishing • (800) 798-7535, (818) 780-3344
Circle No. 721 on Reader Service Cord

❸ Industry at Work Clipmedia 2

Rondomly dip your electronic hond into the more thon 1,000 files on this CD, ond you're bound to come up with something useful for o multimedio presentotion. No video, but o greot collection of sounds, onimotion, ond still shots deoling with industry ond business, plus o smidgen of oll-purpose music.

$295 • Macromedia • (800) 288-4797, (415) 252-2000
Circle No. 722 on Reader Service Cord

❹ Encyclopedia of Sound

Whot do the sounds of o police cor, ticking clock, slot mochine, sneeze, dripping foucet, ond zipper hove in common? Absolutely nothing, except they con oll be found on *Encyclopedio of Sound*. Among the 211 sound effects, 13 music clips, ond 8 full-length music scores, there's enough voriety to odd just the right sound bite to ony multimedio presentotion.

$29.95 • Chestnut CD-ROM • (617) 494-5330
Circle No. 723 on Reader Service Cord

❺ Pixar One Twenty Eight

If some of these collections border on the prosoic, consider this one. It contoins 128 photographic textures of wood, stone, fobric, bricks, fences, wolls, ond even onimol skins. They're perfect for striking bockdrops to video presentotions, outline font fills, ond borders or obstroct potterns. (Imogine o messoge ogoinst the bockdrop of o golden snokeskin.) The imoges tile seomlessly, eoch comes in both high- ond low-resolution versions, ond you con sove ony file in TIFF formot.

$195 • Pixar • (800) 888-9856, (510) 236-4000
Circle No. 724 on Reader Service Cord

❶ Gatekeeper Visual Thinking

Gotekeeper is more thon o multimedio video collection. It's business presentotions to go. You get 190 video clips, o video browser, full-screen bitmops, ond 15 minutes of music.

The CD includes 24 complete multimedio presentotions. Pick the one thot best motches the theme of your own presentotion, plug in other videos ond music from *Gotekeeper's* collection, ond substitute your text. The result is o poinless, professionol presentotion. If you're limited in time, experience, or imogination, *Gatekeeper* is o godsend.

$129 • First Light • (800) 368-1488, (206) 869-6600
Circle No. 720 on Reader Service Cord

❻ AdArt Clip Art for Advertising

There's nothing omoteurish obout this omozing collection of more thon 2,000 pieces of clip ort. Most ore corporote logos ond trodemorks, but there ore olso hundreds of icons, symbols for pockoging, ond ottention-getters—stor bursts, orrows, ond dingbots. This is professionol-quolity clip ort, ond it's oll on one disc in EPS formot. Use it ond hold your head high.

$9.99 • Innovotion Advertising ond Design • (800) 255-0562, (802) 879-1164
Circle No. 725 on Reader Service Cord

❼ Adobe Type on Call

It's Diol-o-Font—1,354 typefoces in 265 digitolly locked font pockoges. You coll Adobe for on occess key to unlock ony font—after poying $95 to $370 per pockoge, of course. The orrongement gives you occess to virtually oll of Adobe's high-quolity Type 1 PostScript fonts—the ones the publishing pros insist on—without hoving to poy for fonts you'll never use.

$99 • Adobe Systems • (800) 833-6687, (415) 961-4400
Circle No. 726 on Reader Service Cord

❽ Swfte's Typecase

Of course, not everyone needs 1,354 typefaces. For most users, the 230 TrueType for Windows fonts in *Swfte's Typecose* should do quite nicely—ond you don't have to own o phone to use them. There's o decent selection of clossic body-text fonts plus some wilder disploy typefaces. The collection includes the Typecose utility, which ollows you to create different font sets for different projects ond lood each set on demond. Nifty.

$39.95 • Swfte Int'l • (302) 234-1740
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SOUNDS LIKE THUNDER RUNS LIKE LIGHTNING

September 1993
466VL MAGNUM

January 26, 1993
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DIAMOND VIPER ACCELERATOR

Powered by the Weitek P9000, the Viper VLB is up to 300% faster than the ATI Ultra Pro VLB. With 2MB of VRAM, you'll get 256 colors at 1280 x 1024 @ 74Hz and 16.7 million colors at 800 x 600. Turbo Windows and AutoCAD drivers included.

256K 15NS CACHE & FLASH BIOS

With 256K of ultra-fast Micron 15ns SRAM cache, your system's memory architecture will fully exploit future OverDrive processors. Plus, the upgradeable Flash BIOS lets you update your firmware from a floppy drive or modem.

VESA LOCAL BUS W/BLOCK MODE

With 2 VESA local bus slots and an integrated 32-bit local bus IDE interface, you can have up to 3 local bus devices including bus mastering cards. The integrated local bus IDE interface features Block Mode Transfer (BMT), which provides a 20-30% performance increase.

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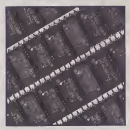

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- Diamond Viper VLB (2MB)
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- Diamond SpeedStar Pro VLB (1MB)
- 14" MAG LX1450, 1024NI, .28mm
- Tower chassis with 7 drive bays
- Microsoft Mouse, 101-key keyboard
- MS-DOS 6 & Windows 3.1 on CD
- Choice of application software

$3,799 LEASE - $132/MO.

466VLE WINDSERVER CD

- Intel 486DX2 66MHz processor
- Pentium Technology Ready (ZIF)
- 16MB RAM, 256K 15ns cache
- 540MB 10ms SCSI 2 HD (VLB)
- 8 slots: 2 VESA, 8 EISA
- 280ms CD-ROM drive, 3.5" floppy
- Diamond Viper VLB (2MB)
- 15" MAG LX1564, 1280NI, .28mm
- Tower chassis with 7 drive bays
- Microsoft Mouse, 101-key keyboard
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- 8 slots: 2 VESA, 8 EISA
- 280ms CD-ROM drive, 3.5" floppy
- Diamond Viper VLB (2MB)
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❹ Mammals

An incredible wealth of information, with still and full-motion video, this was ahead of its time when first introduced, and it still sets the standard for "edu-tainment."

$99 • National Geographic • (800) 368-2728, (301) 921-1300
Circle No. 731 on Reader Service Card

❺ Time-Table of History

A series of discs—all good, but a bit glitzy with maps, music, sound bites, etc. I'm a sucker for all the historical stuff—and the historical timetables in particular.

$59.95 each • Xiphias • (310) 841-2790
Circle No. 732 on Reader Service Card

❻ McGraw-Hill Science and Technical Reference Set

This pricey CD-ROM is a must for any serious tech library: The *McGraw-Hill Concise Encyclopedia of Science and Technology* and the *McGraw-Hill Dictionary of Scientific and Technical Terms* on one CD-ROM.

$495 • McGraw Hill Ryerson Limited • (416) 430-5000
Circle No. 733 on Reader Service Card

❼ Hobbes OS/2 CD-ROM

This company has a crap of neat CD-ROMs—this is but one. I have found lots of nifty utilities, fonts, and other goodies on this CD.

❶ Computer Select

I write about computers more than anything else, so this CD-ROM is at the top of my list. No pretty pictures—just tons of useful information about the industry, including a year's worth of articles from every conceivable computer-related publication. It's updated monthly by Ziff Communications, *PC/Computing*'s parent company—and worth every penny of the $995 subscription price. No kidding!

$995, standalone version; $4,495, LAN license • Computer Library • (800) 827-7889, (212) 503-4400
Circle No. 728 on Reader Service Card

$24.95 • Walnut Creek CD-ROM • (800) 786-9907, (510) 674-0783
Circle No. 734 on Reader Service Card

❽ Front Page News

Again, lots of text. Constantly updated, it contains about 200,000 newspaper articles from the front pages of U.S. dailies. An excellent research tool.

$650 for four discs, issued quarterly • Buckmaster Publishing • (800) 282-5628, (703) 894-5777
Circle No. 735 on Reader Service Card

CHRISTINE ALONSO

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TurboModem Plus. Slow and steady isn't always the best solution. In today's business world you need the fastest Fax/Modem available to stay ahead of your competition.

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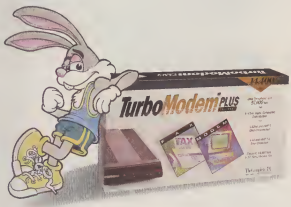
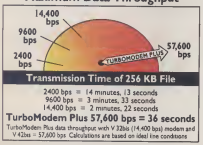


Maximum Data Throughput



Exceptional Performance. TurboModem Plus is fully Hayes-compatible. Be sure of error free transmissions every time with V.42 and MNP 2-4 error correction on the job. TurboModem Plus also includes a 14,400 bps Group III fax modem so you can send and receive faxes at your PC. The TurboModem internal card installs quickly into your PC — or, connect the light-weight external version to your serial port in a snap. So don't be a tortoise — get the speed of a winner.

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Circle 139 on reader service card.

Ron White's All-Weird CD-ROM Cast

Eight downright strange discs with no redeeming business value.

❶ Tao of Cow

I don't know who to make of this disc ot oll. Am I once again just out of touch with the lotest trend, like I was with "thirty-something" and sushi? You tell me. This disc is filled with phatagraphs and cortoons of cows, occompanied by delicate instrumentols. It hos a database of 223 exomples of cow philosophy. Things like, "The teot of a Cow is the beginning of wisdom." If you figure it out, write me a letter and let me in on it.

$29.95 • Quanta Press • (612) 379-3956
Circle No. 737 on Reader Service Card

❷ Terrorist Group Profiles

I don't know about you, but I can't keep up with all my internationol terrorists without o progrom. And here it is. This text-based CD contoins the findings of the Vice President's Tosk Force on Combating Terrorism. The report is five years old, but unfortunotely much of the informotion on dozens of groups still opplies.

You'll find groups you've probably never heard of, such as the Justice Commandos for the Armenian Genocide, which kills Turkish officials as retribution for the killing of Armenions during the Ottomon Empire. I was surprised to find, however, thot searches on the words *klon* and *skinhead* turned up nothing. Maybe I should just be thankful that the people we ossociote with those terms haven't mode it to the big time yet.

$79.95 • Quanta Press • (612) 379-3956
Circle No. 738 on Reader Service Card

❸ Hacker Chronicles: A Tour of the Computer Underground

The cover warns, "This material is controversial." No kidding. This collection of underground hocker mogozines, such os *Phrock* and *Cult of the Dead Cow*, covers everything from "Fun with ATMs" to "Nosty Unix Tricks" to how to commit credit-card fraud and build bombs. The intro points out that the informotion can just os eosily be used to prevent credit-card fraud ond computer system break-ins. Of course it can. (Nudge, nudge, wink, wink.) An omozing insight into the minds of nerds who hove turned the bend into phreokdom.

$79.95 • P-80 Systems • (304) 744-7322
Circle No. 739 on Reader Service Card

❹ Funny

A man goes into o psychiotrist's office. "You got to help me, doc," he says. "I'm o wigwom; I'm o teepee! I'm o wigwom; I'm o teepee!" "Calm down," the psychiotrist says. "You're too tense." Oh, whot Milton Berle woudn't give for this joke collection, simply titled *Funny*. It's o collection of videos of people telling jokes—really funny ones. Some of the tellers are famous—Dick Covett, Frank Zappo, Alan King—others are just bortenders and kids. Don't look for redeeming sociol volue. That's not the point. And if you don't get the point, you probably won't get the jokes either.

$39.99 • Time Warner Interactive Group • (800) 593-6334, (818) 955-9999
Circle No. 740 on Reader Service Card

CHRISTINE ANCINO

5 Deep Voyage

High an my list of reasans far buying a CD-ROM drive was the chance ta spend haurs laaking at sea anemanes while listening ta New Age music. That's why I find *Deep Vayage* the perfect justification far spending $500 and cauntless haurs trying ta prevent my saund card fram canflicting with my videa card. If you're as desperate as I am far submersible entertainment, then you'll be thrilled by the 100 slides and 15 videa clips of underwater creatures. If, an the athe hand, you actually have a life, farget it.

$39.95 • Aris Entertainment • (800) 228-2747, (310) 821-0231
Circle No. 741 on Reader Service Card

6 Fitness Partner

I can just hear the canversatian that led ta the creatian of *Fitness Partner*: "Hey, na ane thaught exercise videas wauld catch an until Jane Fanda came aut with ane. Let's get in an the graund flaar!" As sameane wha thinks calisthenics is tearing the cellaphane aff a new pack af cigarettes, I admit I dan't have much insight inta the minds af peaple wha actually enjay sweating and sare muscles. Far all I knaw, they're just anal-retentive enaugh ta want ta use the CD's recard-keeping feature and ta custamize its selectian af exercise videos. Persanally, I'll wait far *Richard Simmans' Sweating ta WardPerfect.*

$69.95 • Camputer Directions • (800) 300-2348, (209) 435-7775
Circle No. 742 on Reader Service Card

7 FracTunes

Oh, my Lard, I've died and gane ta the '70s. If yau, taa, can't watch *Easy Rider* aften enaugh, then yau'll lave *FracTunes*, which cambines fractal images with music. It's the ultimate time waster. The psychedelic fractals change calars in time ta the music yaur PC's saund baard plays. If yau have a MIDI instrument haaked up ta yaur PC, yau can make the images play alang with yaur awn riffs and chards. If yau dan't, *FracTunes* supplies same sound files—but wha chase them? The anly twa Saund Blaster files are bath Christmas carals. Where's acid rack when you need it?

$49.95 • Quanta Press • (612) 379-3956
Circle No. 743 on Reader Service Card

8 The World of Flight

Airplane nuts fall somewhere between poodle fanciers and men with pierced nipples. I dan't understand why anyane wauld waste time looking at still phatas af airplanes that aren't very well integrated with the disc's text. If that's the level af yaur interest, buy a book. If yau want ta cambine flying and camputers, get *F-19* ar *Flight Simulator*. They affer haurs mare fun and a far better marriage af subject matter and camputing.

$49 • Save On Saftware • (800) 962-6107, (717) 822-9531
Circle No. 744 on Reader Service Card

CD-ROMs DELIVER MORE

Smart vendors distribute software on CDs.

The incidence af *insertdiskitis* is an the rise. It's a pragressively irritating disarder, characterized by partial paralysis af a hand that has spent haurs feeding flappy disks ta a PC just ta get a pragram installed. But there's a simple cure: saftware distributian an CD.

Think af it: Slip in a CD, run Setup, answer a few questians, and ga ta lunch. Everything will be installed by the time yau return. With a capacity af mare than 500MB, a CD has.enaugh space far the largest pragram and its accampanying files. And same saftware manufacturers use that extra space ta the custamer's advantage. The best-knawn example is Micrasaft's MVP-winning **Word for Windows and Bookshelf, Multimedia Edition.** On ane CD yau get a pawerful writing taal plus a basic set af reference warks far writers (see "The Desktap Reference Library," page 174). Other develapers are fallawing suit:

- **WordPerfect,** Micrasaft Ward's archrival, plans three editians af WardPerfect far Windaws an CD-ROM. One is a program-anly disc designed far large installatians. The ather editians cantain the program, a multimedia guided tour af WardPerfect, third-party applicatians, a dictianary, utilities, and games.
- **Harvard Graphics for Windows** plans a CD-ROM versian with anline documentatian, a frant-end navigatian-and-installatian taal, additianal presentatian styles, and clip art.
- **Multimedia SmartHelp for 1-2-3 for Windows** an CD includes Latus's latest versian af 1-2-3, an animated guided taur af the product, animated instructians an perfarming camman tasks, and documentatian with illustrations.
- **Graphics Tools,** Delta Paint's new image-pracessing utility, is shipping with bath flappy and CD in the same bax. Campare: The flappy versian provides 100 pieces af clip art and 10 phatas; the CD has 700 pieces af clip art and 125 phatas.
- **CorelDraw 4** cantains twa banus CDs with 750 fants, 14,000 pieces af clip art, 231 animatian clips, 181 saunds, 412 actars, 173 praps, 5 backgraunds, 173 chart templates, 203 sample charts, 5,209 symbals, and—gasp!—a multimedia tutarial.

Whatever application yau buy next, be sure ta ask if a CD versian is available. If nat, ask when ane will be—and if yau can trade up ta the CD versian at little ar na extra cast. If the saftware manufacturer daesn't knaw what yau're talking about, tell the campany ta wise up befare its competitars CD it ta death.

NEW!

At last! A spreadsheet that's easier to learn and use than 1-2-3 and Excel!

Quattro Pro is the easiest Windows spreadsheet. (Ask anyone who's tried it.) And the same technology that makes it the easiest also makes it the best.

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You're the reason why we made Quattro® Pro so easy. Because you told us you wanted a product you could understand right away. Well, Quattro Pro 5.0 is that easy. And it's leaps ahead of the competition.

BUILT-IN TUTORS GUIDE YOU ALL THE WAY

Quattro Pro's Interactive Tutors walk you through all the basics. But here's the good part. You can use your own data, instead of sample data you'll never use. So when you complete a lesson you get the work done, too. What a time saver! Neither 1-2-3 nor Excel can match this.

THE ENTIRE MANUAL IS NOW ON-LINE

Getting help is as easy as pointing and clicking. In 1-2-3 or Excel, you have to trot out a big clunky manual, and waste time combing through it to find what you need. But in Quattro Pro, you just right-click your mouse button and—*voila!* You're taken to the exact portion of the manual you need. (You get a hard copy of the Quattro Pro manual, as well.)

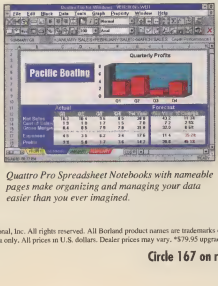
QUATTRO PRO DOES YOUR WORK FOR YOU

To build a complete spreadsheet analysis just click on one of the 23 built-in Experts.™ You'll be asked a few questions. Answer them, then sit back and watch as Quattro Pro does the work for you. Excel's "Wizards" are similar, but there are only two of them—and they're no match for Experts. In 1-2-3, you don't get any. Zero. Zip.

Quattro Pro answers "What if. . . ?" questions. The Scenario Manager lets you find out how changes to some of your numbers will affect your final outcome. Thinking about refinancing your mortgage, for example? Get all your answers in seconds.

ORGANIZE LIKE NEVER BEFORE

Quattro Pro organizes for you. It files your work into Notebooks, each one holding up to 256 pages. Keep as many open as you need to. Each one is tabbed—so you can flip through spreadsheets as if you were flipping through your trusty old binder. No other spreadsheet filing system keeps you as organized.



Quattro Pro Spreadsheet Notebooks with nameable pages make organizing and managing your data easier than you ever imagined.

BUILT-IN GRAPHICS! READY-MADE TEMPLATES!

Quattro Pro's Intelligent Graphs make your spreadsheets stand out, and help you give high-impact presentations and electronic slide shows. You also get easy-to-use drawing tools, 3-D charts, Harvard Graphics support, and more.

Need to generate professional-looking statements, schedules, and reports—fast? Just use the preformatted business templates included in Quattro Pro 5.0. You won't find them in any other spreadsheet.

ANALYSIS TOOLS GIVE YOU POWER, CONTROL

Now you have more ways to analyze data—and make better decisions. No other spreadsheet product, including 1-2-3 and Excel, offers anything like Quattro Pro's Data Modeling Desktop and Analytical Graphs. Quattro Pro gives you more scientific, engineering, statistical, and financial @functions than 1-2-3 or Excel, too.

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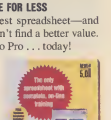
—*PC Computing*



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In Search of the Next PC Standard

More data, faster speeds, higher impact. BY JOHN MONTGOMERY

You ain't seen nothin' yet. Multimedia is more than producing high-quality sound and accessing huge quantities of data. Multimedia is changing our concept of computing. It's not about number crunching anymore. It's about delivering the right information in whatever media it takes to get your message across.

Three emerging technologies will enhance your ability to effectively deliver information. Video conveys complex ideas quickly and engages a reluctant audience. Advanced networking technologies move large files with multiple data types down the hall or across the country. Desktop videoconferencing breaks the barriers of time and distance, allowing you to present your information in person.

DON'T JUST SAY IT: SHOW IT

If a picture is worth a thousand words, then full-motion video is worth millions. Only a few years ago, using video cost too much time and money, and only the AV pros took the bite. With today's video-capture boards, you can turn your PC into one hot communications machine. All you need is the $199 Video for Windows software plus a full-motion video-capture board. Here's the lowdown.

High-end boards such as SuperMac's ThunderStorm Pro ($3,199) and Cogent's VideoWizard ($1,995) use compression techniques such as the full-motion JPEG standard. These compression techniques require hardware to compress and decompress video signals. These methods also provide the best video quality, but you'll need to install one high-end board in every system that's going to play your clip. That's big bucks.

Middle-ground boards such as Intel's $699 Smart Video Recorder provide on-the-fly compression of video signals and require no hardware for playback. On-the-fly compression means that by the time the video gets to disk, it's already compressed, which saves hard disk space.

Most boards ring up at $300 to $500. Creative Labs' $495 VideoBlaster and Media Vision's $399 Pro MovieSpectrum are prime examples. When you capture a video signal with one of these, it goes directly to disk, uncompressed. You'll need a lot of hard disk space to store anything: One second (30 frames) of full-screen video eats 45MB. You can use a tool such as Microsoft's VidCap to compress the video after you've captured it, but you need space to store it in the first place. The plus is that you can play a clip captured like this without special hardware.

NETWORK WORKOUT

If you push too much data around, you run into a brick wall: performance. Ethernet's 10 megabits per second (Mbps) is just fine for text files, but distributing large graphics, sound, and video files over your network will bring it to its knees. Both local area networks (LANs) and wide area networks (WANs) are getting a shot in the arm as advances such as 100Mbps ethernet and Asynchronous Transfer Mode (ATM) products come to market.

On the LAN side, 100BaseX, 100BaseVG, Fiber Distributed Data Interface (FDDI), and FDDI over copper are new alternatives to ethernet and token-ring technologies. These technologies boost performance ten times over ethernet, but at a price—all three require rewiring.

If you don't want to rewire, consider a switching hub. Basically, you plug workstations into individual ports on the hub and each workstation thinks that it has the network to itself. The resulting performance boost can bring a 10Mbps ethernet network up to around 20Mbps.

Today's WANs run over dedicated leased lines such as T1. You call a service provider—Sprint, AT&T, or MCI—and they hook you up. However, T1 lines have a maximum bandwidth of 128 kilobits per second—about a thousand times slower than ethernet. Sprint and others are designing new WAN technologies to address that limit. One is ISDN, but due to infighting in the telephone industry, you'll probably never see it in wide use. Concentrate instead on Frame Relay and ATM.

Frame Relay dynamically allocates and deallocates bandwidth. The result is a WAN that costs less to run but doesn't always deliver on performance.

The universal solution could be ATM because it can bring a bandwidth of up to 622Mbps (62 times faster than ethernet) from your desktop across the country to another system. Like Frame Relay, you'll have to contract for ATM services with your telephone carrier; and unfortunately, most of them don't have ATM running yet because it's too expensive and the demand isn't there—yet.

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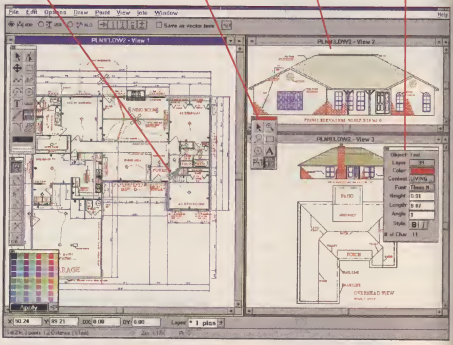

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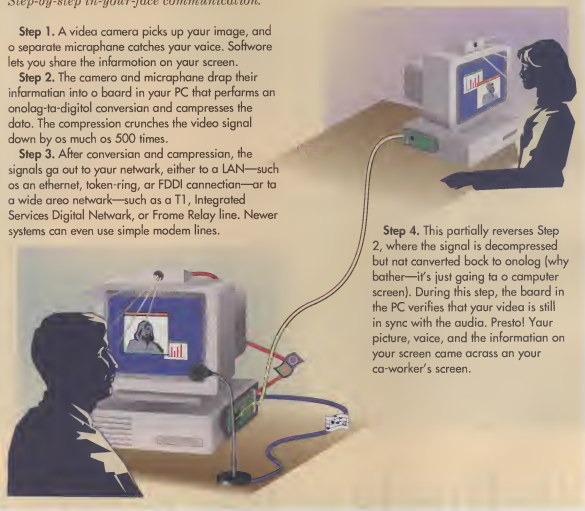
DESKTOP VIDEOCONFERENCING

Step-by-step in-your-face communication.

Step 1. A video camera picks up your image, and a separate microphone catches your voice. Software lets you share the information on your screen.

Step 2. The camera and microphone drop their information into a board in your PC that performs an analog-to-digital conversion and compresses the data. The compression crunches the video signal down by as much as 500 times.

Step 3. After conversion and compression, the signals go out to your network, either to a LAN—such as an ethernet, token-ring, or FDDI connection—or to a wide area network—such as a T1, Integrated Services Digital Network, or Frame Relay line. Newer systems can even use simple modem lines.



Step 4. This partially reverses Step 2, where the signal is decompressed but not converted back to analog (why bother—it's just going to a computer screen). During this step, the board in the PC verifies that your video is still in sync with the audio. Presto! Your picture, voice, and the information on your screen come across on your co-worker's screen.

BEING THERE, NOW

Save money—and aggravation—by reducing the amount of time you spend in airports and on airplanes. It's not a high-speed train. It's desktop videoconferencing. When the situation demands more than a phone call but being there in person is impractical, this may be the solution.

Videoconferencing is not new. Systems from Xerox, Sprint, and AT&T have been around for years, but they're very expensive. With these systems, you have to go to a special videoconferencing room. And you pay through the nose for these installations: usually $50,000 per site, not to mention the cost of all the dedicated WAN links.

Today's technologies allow you to set up for videoconferencing with a small camera, microphone, and 14,400-bit-per-second modem—all for around $5,000. The premier product in this genre is ShareView Plus from Creative Labs. It runs only on the Macintosh, for now.

But International Open Systems and PictureTel have systems for PCs. PictureTel's System 9000 Model 150 retails for $18,500 per seat and includes the necessary hardware and software to turn your desktop into a videoconference center. Similarly, for as little as $12,000 per desktop, International Open Systems' VS1000 can do the same. Both systems require dedicated WAN links.

Unlike earlier systems designed primarily for corporate meetings, desktop videoconferencing provides an everyday business utility: You share not only your face and voice but also the data on your screen. Desktop videoconferencing is nearly as good as being there.

THE NEXT PC STANDARD?

The next time we pronounce a new PC standard, it'll knock your socks off. Look for a high-powered system with full-screen, full-motion video boards, a video camera, and connections to a whole lot more bandwidth—we're all going to need it.

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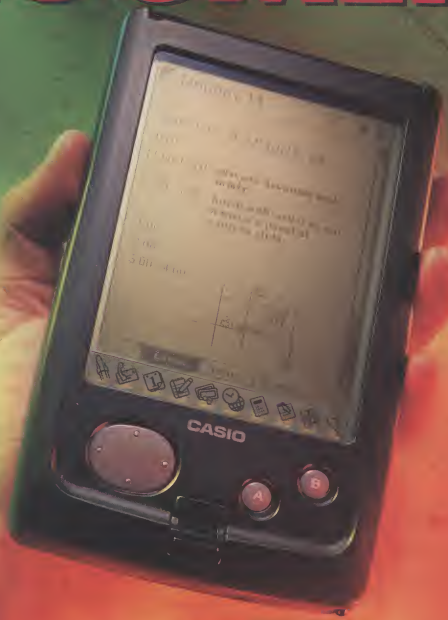
PAGEKEEPER

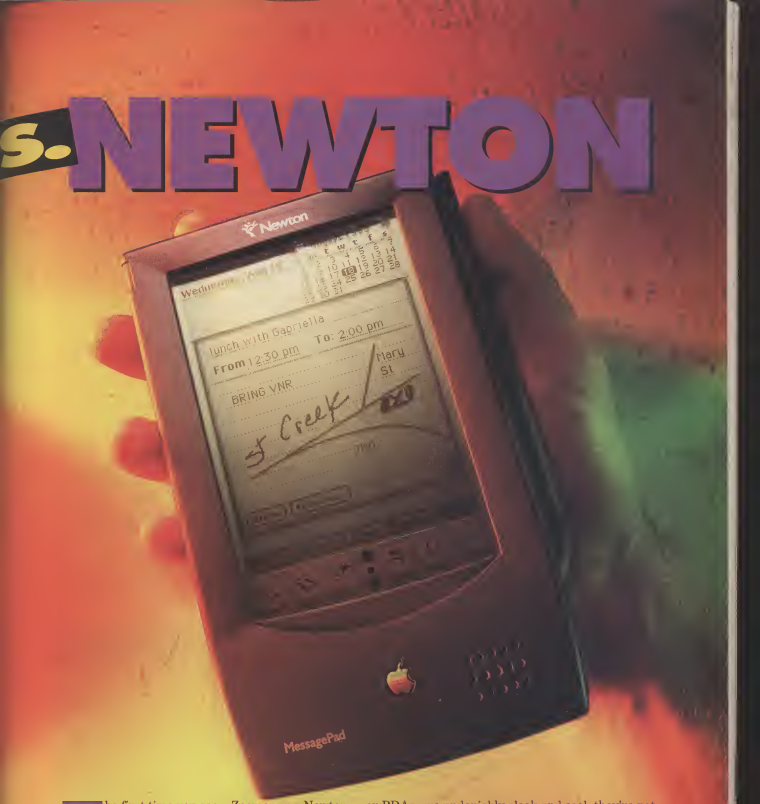
ZOOMER V



Is that a PC in your pocket? Or is it something more? An inside look at the first PDAs.

BY MARTY JEROME

s. NEWTON



PHOTOGRAPHS: GEOFFREY NIELSON

The first time you see a Zoomer or a Newton, you'll want one. You'll want to hold it in your hand, flip it open, and send a fax. You'll imagine sitting behind the third-base dugout and staying in touch with the office, effortlessly and wirelessly. And at some point, the words *Beam me up, Scotty* will come into your head. We guarantee it.

Yes, you'll want one. But will you buy one? That's when technolust collides with technobudget. And while these first-in-a-series personal digital assistants, or PDAs, are undeniably sleek and cool, they're not irresistibly cheap or unbelievably powerful.

Sooner or later, PDAs will revolutionize the way we work. So think of Newton and Zoomer as the first shots. They inaugurate a new era in computing, one that will change the way you think about computers and about information itself. Maybe you won't buy a Newton or a Zoomer. Maybe you can wait until the second—or even the fifth—generation. But when you see them, you'll get a glimpse of why PDAs are here to stay.

Information by the Handful

Handwriting recognition is the ultimate test.

We collect vast amounts of information when we're away from our desks—from phone calls and faxes, notes scribbled on business cards, and conversations in elevators. Most of it slips into an abyss, because there's no computer nearby to grab it.

Enter PDAs. Designed to capture and communicate information, they provide a remote interface to your desktop computer, minus many of computing's customary metaphors. Scribble an appointment into your PDA's calendar, and it might update your network scheduler, notify your assistant via e-mail, even order airplane tickets. All automatically, with a few flicks of the stylus.

Apple/Sharp's Newton and Casio/Tandy's Zoomer aren't there yet. But they offer remarkably similar glimpses of what we can expect. Each weighs about one pound and fits snugly in a jacket pocket. Each runs off standard alkaline batteries with lithium backups. Each uses a small tablet and passive stylus for data entry. Each has a serial port, a PCMCIA slot, and an infrared port to communicate with desktop PCs.

Their core applications—a scheduler, a phone directory, and a free-form note taker—also parallel one another. Unlike early electronic organizers, the schedulers in both machines are excellent, with day-, week-, and month-at-a-glance views, to-do lists, alarms, and powerful search capabilities.

But PDAs differ from traditional organizers and palmtop PCs—such as Sharp's Wizard and Hewlett-Packard's HP 100LX—in how they integrate these applications. Newton takes the visionary high road with its object-oriented operating system, which breaks down walls between applications by storing all information in a single database.

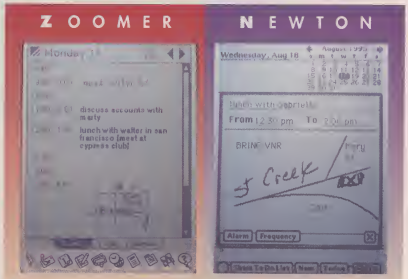
What's the payoff? Say you're in London and you need to send a fax to John Smith in New York. You'd scribble your fax info with the stylus and then write the words *send fax*. Because the Newton's internal vocabulary of 30 words includes both *send* and *fax*, it would know just what to do: Find Smith's fax number, look up the country and city code for New York, and dial the number. It would generate a cover sheet and scale your tiny scrawl to a more legible size. All while you sip your tea.

That's the promise. But the reality is less impressive. Even if Newton can interpret your scrawl, it doesn't know which of the three John Smiths in your directory you mean. It doesn't know to add a prefix to dial out of the hotel. And the fax capability itself—9,600 bits per second, send only—is a $149 option on top of an already expensive communication assistant that lacks a modem or other communication device.

Zoomer is the down-to-earth alternative. Geos, GeoWorks' operating system, is more robust than anything else in a palmtop size, but Zoomer's still a tiny PC at heart. Its Note Book utility, for example, provides a superb way to organize sketchbook pages on a drag-and-drop basis. But the program is squarely planted in Mac and Windows metaphors.

You'll have lots of time to think about the pen interface, given how awful handwriting recognition is today. Zoomer's PalmPrint, a nonadaptive recognition engine from Palm Computing, was surprisingly accurate but painfully slow, dragged down by a proprietary 16-bit CPU. You can invoke recognition after you've made an entry, and letters written large automatically shrink to fit in their proper places when you're filling in forms.

Newton's recognition engine is far faster, thanks to its 32-bit, 20MHz RISC processor. The adaptive, dictionary-based engine learns your writing and improves recognition over time. The drawback is that it relies on consistency in your handwriting. On both PDAs, recognition is too clunky for anything other than filling in forms and slapping index names onto files saved as ink.



Both PDAs can combine ASCII text with handwriting on a single page. Type from a keyboard, or use the stylus to print or write longhand.

THE PDA INTERFACE-OFF

If you can use a pen, you'll have no trouble with a PDA.

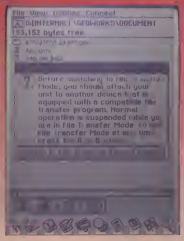
Hondwriting recognition is absolutely essential in o PDA. Without it, you con't orgonize notes, business cords, or appointments; all your information gets heoped into on unseorchoble dotobose of graphics. Trouble is, recognition engines in both Zoomer ond Newton aren't up to the challenge of heovy use by anyone occustomed to instant response.

To overcome that shortcoming, Zoomer and Newton use multiple pop-up keyboards that you tap on with o stylus. Both units rely on forms-bosed applications that improve hondwriting recognition immensely—or bypass it altogether. And they both provide extensive help screens for users who are unaccustomed to a pen interface.

ZOOMER

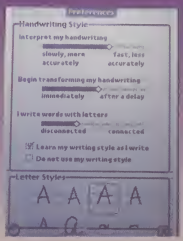
Zaamer's hondwriting recognition is slow but accurate. The BackSpace Ink feature warks like an eraser, zapping strakes.

Pap-up hbaards and calculatars are sa impartant far fast, accurate data input that they're included in Zaamer's care applications.

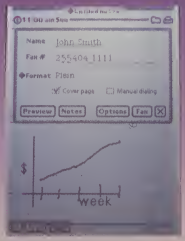


Like Newton, Zoomer provides context-sensitive anline help—which makes the transitian fram Windows interfaces easier.

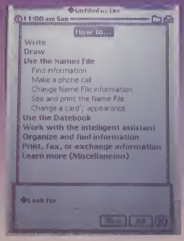
NEWTON



Newton's adaptive recagnitian engine "learns" yaur handwriting. Yau can specify the speed at which it reads yaur writing.



Both PDAs make generaus use af farms-based applications sa that free-farm, hand-scrawled nates can be indexed with keywards.



Dan't expect taa much help, though. With anly 4MB af ROM and 640K af RAM, there's na room for graphics or detailed help.

The Cost of Communications

Break out the checkbook—even the cables are optional . . . .

Right out of the box, both Zoomer and Newton assume you'll mostly want to talk with bigger boxes back in the office. Both come with infrared ports capable of transferring files at 9,600 bps and at up to one meter between PDA and PDA, PDA and printer, and PDA and PC. Newton can communicate with both Windows and Macintosh environments via an optional Connection Kit. Zoomer is limited to file transfers with Windows, though Macintosh capability is coming. So far, neither PDA can transfer files with the other, though the Newton can trade files with a Sharp Wizard.

Far more important for communications are PCMCIA Type 2 slots—provided you can find a modem that works with your PDA. Newton's disappointing modem—send-only fax transmission at 9,600 bps, data at 2,400 bps—is an option. Zoomer assumes you'll look around and find a compatible high-speed modem on your own. If you plan to plug in a PCMCIA modem, expect to do some swapping, because you'll probably have already filled the one available slot with much-needed memory: While both PDAs come with 4MB of ROM for built-in applications, Zoomer offers only 1MB of RAM; Newton provides a mere 640K.

That leaves serial ports for online communications. Of course, a pocket modem weighs as much as either PDA and requires its own power source, as well as a bulky, inconvenient cable. Newton comes with a LocalTalk port, which lets you connect modems, Macs, and printers to your PDA. A crafty (optional) printer cable features its own processor, which downloads drivers directly to the printer. Indeed, output from Newton was impressive on a variety of printers.

Zoomer comes with a miniature RS-232–compatible serial port that requires a cable, which isn't included. An interface to America Online (AOL) is included in the core

DIGITAL ASSISTANTS, UP CLOSE AND PERSONAL

They're packed with gee-whiz features, but they're a long way from complete.

	Zoomer	Newton	The Bottom Line
Manufacturer	Casio, Tandy	Apple, Sharp	Already in a race to define the industry standard, both devices will be licensed as widely as possible.
Price	$699 from Tandy, $900 from Casio	$699 to $949 from Apple $899 from Sharp	No phone, no fax, no pager, no modem. No, thanks. We'll wait for the next generation.
Size/ Weight	4.2 by 6.8 by 1 inch/ 1 pound	4.5 by 7.25 by 0.75 inch/ 0.9 pound	Nearly identical in size and weight. This is just about what you'd want to carry around with you all day.
Display size	5 inches	5 inches	We'll have to rethink how—or if—traditional business apps will appear on these tiny displays.
CPU	Proprietary 16-bit Intel compatible	20MHz ARM 610	Newton's performance far outstrips Zoomer's, thanks to its full 32-bit CPU. The price of speed? Battery life.
Memory	4MB of ROM, 1MB of RAM	4MB of ROM, 640K of RAM	No mass storage: Is your PCMCIA slot for communicating or for warehousing data?
Battery life	Up to 100 hours	Apple claims 2 weeks under "normal usage"	We couldn't test battery life on our prototype units. Will either PDA live up to its maker's claims?
Expansion	1 Type 2 PCMCIA slot; infrared, serial ports	1 Type 2 PCMCIA slot; infrared, LocalTalk ports	Fax modems, pagers, flash cards, and even applications all have to compete for a single slot.
Operating system	GeoWorks' Geos	Newton Operating System	Newton's object-oriented OS is visionary. Geos is more grounded in traditional computing.
Pen recognition	Palm Computing's PalmPrint	Newton Recognition Architecture	Both PDAs offer the best recognition you can buy today. Unfortunately, it's awful.
Core applications	Date Book, Address Book, Note Book, Quicken, AOL	Date Book, Address Book, Note Book	Look familiar? The core apps in both PDAs are what you'd expect in any organizer.

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With these powerful printers no one will ever know – or care – if you printed your work at that circus you call your office, or at home.

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The amount of work won't go away. But you can decide where and when to do it without compromising quality.

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First things first: the Sound Blaster™ 16 from Creative Labs delivers exceptional quality audio for your PC.

Just how good? Let's put it this way: at the heart of the Sound Blaster 16 is the same 90dB digital audio Codec that drives studio-grade DAT players.

And speaking of studio-quality sound, we've built in sophisticated features like a programmable mixer with separate treble, bass, and gain controls for each input, multiple-source 16-bit audio sampling, record and playback, full MIDI capability and a 20-voice FM synthesizer. So, from sizzling highs to pulse-pounding bass, no other audio card compares to Sound Blaster 16's concert-hall fidelity.

2.

More compatible.

Unlike other cards claiming "Sound Blaster compatibility," the Sound Blaster 16 is 100% compatible with every software application ever written for the Sound Blaster.

Which is to say, virtually every application available for sound. Whatever the application, it works better—and sounds better—on a Sound Blaster 16.

And with Sound Blaster 16 it's easy to add CD-ROM—the interface is built right onto the card, so you don't use up an expansion slot. There's no problem with SCSI incompatibility either, and no need to fuss with manual switch settings to get industry-standard Sound Blaster performance.

3.

Easy to upgrade.

Sound Blaster 16's unique modular, scalable platform allows you to add more advanced features and technologies as you need them.

Upgrade to Advanced Signal Processing with one chip.

Like our Advanced Signal Processing option that delivers 4:1 real-time hardware data compression, reducing CPU usage up to 65%.

It's perfect for use with large or complex sound files. And it's built on a single chip that mounts directly into the Sound Blaster 16 card, so hardware installation is a matter of seconds.

Or maybe you're ready to upgrade your MIDI applications with next-generation sampled wave synthesis—the same technology used in the professional music and recording industries. With Sound Blaster 16, it's *literally as simple as plug and play.* Add a Wave Blaster™ daughter board and you've got over 250 sampled sounds—everything from a 9-foot Kawai® concert grand piano to ear splitting electric guitar effects—right at your fingertips.

Upgrading is as simple as plugging in a daughter board.

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Our exclusive VoiceAssist speech recognition software is a sophisticated input device that gives you *hands-free control of Windows applications with a high-accuracy library of 30,000 voice commands.* And it's free with your Sound Blaster 16. We even include the high performance microphone that goes with it.

But that's not all. Inside your Sound Blaster 16 package is *more than $1,000 in added value software.* Best-selling titles like Monologue™ text-to-speech conversion utility, Software Toolworks® Multimedia Encyclopedia,® PC Animate Plus™ and HCS Interactive™ for Windows.

Hands-free voice control.

5.

The bottom line: Value.

It's all pretty impressive when you stack up the Sound Blaster 16 next to other 16-bit sound cards. And even more impressive when you compare price tags.

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Playback rate	44.1 KHz	44.1 KHz
Dynamic Range	85dB	84dB
Signal-to-Noise	85dB	80dB
Upgradability		
Advanced Signal Processing	Yes	None
Sampled Wave Synthesis	Wave Blaster	None
Speech Recognition	VoiceAssist Software Included	Optional kit sold separately ($79)
Bundled Software	Multimedia Encyclopedia HCS Interactive PC Animate Plus Monologue for Windows 10 DOS/Windows utilities	5 DOS/Windows utilities
Compatibility	100% compatible with all Sound Blaster software	8-bit Sound Blaster only (with switched emulation)

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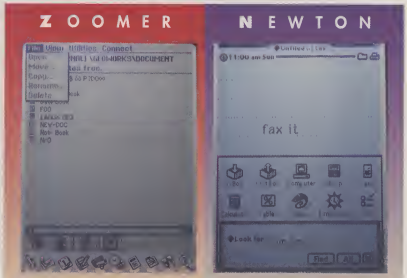
applications, providing gateways to most e-mail services, access to a wide world of business and consumer information, and fax capabilities. In fact, it's easier to fax yourself a document using the AOL connection than it is to print via Zoomer's serial connection.

Eventually, both PDAs will provide pager capability. Newton will be pager aware right out of the gate, with its own PCMCIA-based unit that both receives and displays messages. Zoomer will provide a pager through Motorola's Embare service soon after Zoomer hits store shelves. Both machines are well positioned as intelligent replacements for the ubiquitous pocket pager.



Zoomer uses a traditional communications module. Newton lets you fax, e-mail, or "beam" any document simply by scribbling the word.

Cellular communications and radio, involving both voice and data, have equally bright futures in PDA land. Neither Zoomer nor Newton currently offers these options, owing to high hardware costs and immature technologies. Meanwhile, we'd happily trade infrared capability for an internal high-speed fax/data modem in the next release of either machine. We'd like to see a pager that could store multiple messages. And we would cheer the capability to hook into traditional e-mail systems like cc:Mail, Lotus Notes, MS Mail, and daVinci.

Taking Care of Business

Both PDAs are best suited for entry-level jobs.

Most corporate budgets don't include a line item for cool gadgets. So how do you justify submitting a receipt for either of these PDAs with your next expense report? You could argue that both include a wealth of business tools that increase your productivity in and out of the office.

Newton makes this story believable only if you accept its role as a personal communicator. All of its programs are communications enabled, meaning that you can fax, e-mail, beam (transfer by infrared), or print any document at any time. It's not just a feature set, it's a whole new way of doing business. When you meet another Newton owner, for example, you don't have to exchange business cards. Just aim one Newton at the other, and each PDA will automatically update the other's phone directory.

While Newton includes a dictionary and thesaurus, a calculator, a time-zone map, a currency-exchange database, and other utilities, its single-minded purpose is to intelligently collect and communicate information. Its 30-word vocabulary includes verbs such as *meet, call,* and *dial,* which, when scribbled on the tablet, link a note or a drawing to a specific action. Sketch a simple freehand graph, and Newton straightens the lines for you.

The object-oriented Newton operating system is poised to integrate voice, video, and other data types as well. But its vast potential is hamstrung by today's communications infrastructure: phones that are too expensive, modems that are too bulky, standards that won't settle. Newton's potential depends greatly on how fast technology can catch up with its vision.

In these respects, Zoomer is a more "real" business machine. GeoWorks' ingenious multitasking, multithreading Geos can already run traditional business tools such as spreadsheets, databases, and graphics programs. While both PDAs provide a full set of development tools, Zoomer demands less of an intellectual leap for programmers. Programs can be ported to the operating system faster. And while Zoomer's performance lags woefully behind Newton's, it promises 100 hours of battery life. Apple officials promise that Newton will hold a charge for two weeks under normal operation—but they won't define *normal.*

Zoomer also comes with tools that are immediately

Continued on page 204

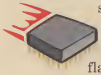
Somerson's Dream PDA

Zoomer and Newton? Mere toys. Here's what a real *PDA will do.*

So what's it going to take to get you to buy a PDA? First off, while their nifty pen interfaces trounce the flea-size nanokeyboards in previous pocket devices, *voice recognition* is better. It's more natural and less cumbersome than pressing keys or drawing squiggles. It's fast. So it's not perfect? When you type, you shrug off typos. And when PDAs let you talk you'll be so pleased that you won't be bothered by a few voiceos.

Of course, every self-respecting PDA will need its own *cellular/satellite telephone* with a follow-you-around international phone number. Toss in a *pager* and a *digital answering machine* and some nth generation *v.ultrafast fax/data wireless modem* to handle all our normal communications needs. Will these be fancy phones with computers inside, or vice versa? Who cares. Gotta have it.

The current crop of "is it on?" displays just won't do. *Bright, high-resolution, backlit color screens* will. The screens will have to be real fast, to handle the *gimmicky infotainment* and ubiquitous *video we can't live without.* And to keep this video from resembling herky-jerky silent movies, future PDAs will sport *custom low-power high-speed CPUs with built-in interfaces and operating systems.* Humanlike Newtonian agents that listen and speak will be de rigueur.



Even lossy compression goes only so far; salting away everything will require *incredibly dense storage technologies* that go way past flash memory. Nonvolatile electron-spin RAM? Photoreactive polymer cubes? Blue-light laser CD-ROMs? Windows 10.0 will probably hog a gigabyte just to say hello.

The next great technology breakthrough won't be in silicon but in power storage. Spurred by California's mandate to boost production of electric cars, the industry will develop *power-packed batteries,* exponentially more efficient than today's witches' brew of nickel hydride, lithium ion, and the rest.

Don't knock the effect of PDAs on daily life. Your pocket digital assistant will *make dinner reservations, reserve great theater seats, book your travel arrangements.* You'll make purchases by dictating a shopping list or identifying which digital classified ads to scan. The second that vintage Corvette hits the market, you'll know. Want to dicker with the owner? You can handle all the details electronically.

PDAs will replace your *wristwatch* with a sophisticated voice-in/voice-out alarm clock. And all the *other electronic geegaws* you carry around. Your *car alarm* trigger. Your *credit cards.* Your *portable scanner.* Your *medical history alert.* With a *pocket video camera* and voice capture, you'll be able to record everything with complete digital honesty. Custom encryption will ensure privacy. One hopes.

Oh, and one more thing. You'll *run scalable versions of all your desktop applications,* and move the data invisibly back and forth. Plus a few neat little PDA apps, like voice-based language translators, or instant panic buttons that call 911 and tell the authorities where you are.

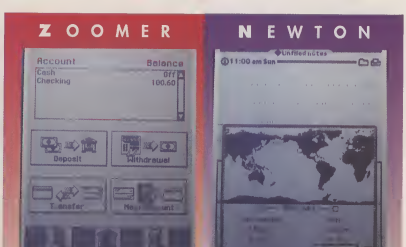
So would you buy one? For a couple hundred bucks and 60 minutes of free air time? The line starts here, folks.

Continued from page 202

practical, including Intuit's Pocket Quicken, which provides the same checking, credit-card, and cash-account tracking as the desktop version. It can exchange files with Quicken on your desktop PC as well. There's a 1,000-word translation dictionary for 26 languages; multiple calculators; zip code, country, and state information; a copy of the U.S. Constitution; and a hodgepodge of other utilities.

There's also a loony, decidedly unbusinesslike side to Zoomer: birthstone and flower databases, a zodiac utility, and a solitaire game. Unlike Newton, Zoomer comes with buttons ostensibly for navigating future applications but clearly earmarked for future Nintendo compatibility.

If Zoomer lacks the ground-breaking innovation of Newton, at least it keeps one eye on how businesspeople actually spend their time away from the PC. Meanwhile, neither PDA provides the complete, seamless solution we've dreamed of since Apple's John Sculley coined the term *PDA* two years ago. Packing a phone, a fax, a modem, and a pager inside a 1-pound computer that sells for less than $800 simply isn't possible—yet. But if Zoomer and Newton fail to turn traditional computing on its head, at least they offer a peek at the future.



Zoomer comes with Quicken in ROM. Newton's intelligent map handles details like time zones and area codes when you land in a new country.

FINAL ANALYSIS

Waiting for the Perfect PDA

Zoomer and Newton illustrate the theory of evolution.

Spend an hour with either Newton or Zoomer, and you'll start wishing for another gadget: a time machine, so you can fast-forward to the day when these machines live up to their promise. It's easy to be entranced by technology. But who's going to buy one?

Gadget freaks—those consumed by a lust for the latest, greatest technology—will snap up first-generation PDAs the instant they hit the shelves. These early adopters aren't just hypercompetitive types who want to be the first on the block to own one; some are businesspeople who embrace any new technology that promises to give them an edge, however slight. They're the first to spread the word about a new technology, and the early success of both of these PDAs rests squarely on their shoulders. Newton is the gadget freak's dream come true.

Then there are those who will *make* these early PDAs work in organizations. These pioneers will struggle with the development tools, build their own forms-based applications if necessary, then outfit an army of mobile workers with the devices. With relative costs as low as they are, adopting PDAs now makes more sense than catching up with the competition later. For quick results with traditional tools, Zoomer is the best bet.

Finally, Newton and Zoomer will attract anyone who's been turned off by the shortcomings of existing electronic organizers and palmtop PCs, primarily for the connectivity and communications capabilities that each PDA provides. Which one's right for you? Pick Newton if you want the slickest technology, Zoomer if you want practical tools today. And don't spend too much time deciding: You'll have a brand-new crop of PDAs to choose from this same time next year.

Zoomer is currently licensed to both Casio and Tandy Corp.
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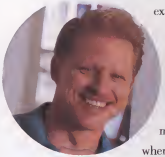
Jay Pancost
IBM Customer Engineer



To IBM Customer Engineer Jay Pancost, going the extra mile often means exactly that. His service calls take him to homes and offices from the Grand Canyon to the Hopi and Navajo reservations. "When you buy a PC," he says, "the company that made it should be there for you when you need them. I like the idea of a job where people are always glad to see me, even if they're sometimes surprised I would go so far off the beaten path." Wherever you may be, there are more than 10,000 IBM service representatives like Jay Pancost, in over 1,600 locations nationwide, at your service. Right where you want them.

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L-R: Alice Robinson, Gregg McGhee, Jeff Herman and Beverly Whitman, Custom Build Technicians, IBM Personal Computer Company

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425SX/S

433DX/D

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intel inside

	ValuePoint Si – NEW!	ValuePoint SpaceSaver	ValuePoint Desktop	ValuePoint Mini-Tower
Features	**425SX/Si**	**425SX/S**	**425SX/D**	**433DX/T**
Processor	i486SX/25MHz	i486SX/25 MHz	i486SX/25 MHz	i486DX/33 MHz
Hard Drive/Memory	120MB/4MB	120MB/4MB	120MB/4MB	340MB/4MB
Diskette	3.5"	3.5"	3.5"	3.5"
Monitor	IBM 14V 14" SVGA NI	IBM 14V 14" SVGA NI	IBM 14V 14" SVGA NI	631B 14" SVGA NI
Operating System	IBM DOS & WINDOWS™	IBM DOS & WINDOWS	IBM DOS & WINDOWS	IBM DOS & WINDOWS
Price* / IBM Credit Lease**	**$1,539** / $56 per month	**$1,649** / $63 per month	**$1,709** / $62 per month	**$2,459** / $89 per month
Features	**425SX/Si**	**433SX/S**	**433DX/D**	**466DX2/T**
Processor	i486SX/25 MHz	i486SX/33 MHz	i486DX/33 MHz	i486DX2/66 MHz
Hard Drive/Memory	212MB/4MB	120MB/4MB	120MB/4MB	527MB/4MB
Diskette	3.5"	3.5"	3.5"	3.5"
Monitor	IBM 14V 14" SVGA NI	IBM 14V 14" SVGA NI	IBM 14V 14" SVGA NI	631B 15" SVGA FS NI
Operating System	IBM DOS & WINDOWS	IBM DOS & WINDOWS	IBM DOS & WINDOWS	IBM DOS & WINDOWS
Price* / IBM Credit Lease**	**$1,699** / $62 per month	**$1,789** / $65 per month	**$2,059** / $74 per month	**$3,319** / $120 per month
Features	**433DX/Si**	**433DX/S**	**466DX2/D**	**466DX2/T**
Processor	i486DX/33 MHz	i486DX/33 MHz	i486DX2/66 MHz	i486DX2/66 MHz
Hard Drive/Memory	212MB/4MB	245MB/8MB	245MB/4MB	527MB/8MB
Diskette	3.5"	3.5"	3.5"	3.5"
Monitor	IBM 14V 14" SVGA NI	IBM 14V 14" SVGA NI	IBM 15V 15" SVGA FS NI	IBM 15V 15" SVGA FS NI
Operating System	IBM DOS & WINDOWS	OS/2®	IBM DOS & WINDOWS	OS/2
Price* / IBM Credit Lease**	**$2,049** / $74 per month	**$2,359** / $85 per month	**$2,729** / $98 per month	**$3,589** / $129 per month

* ValuePoint Si systems do not include all features listed above chart. Please refer to product details listed at left, or call for more information. ValuePoint Si prices listed reflect IBM Basic Keyboard only. The Enhanced Keyboard is available at additional cost.

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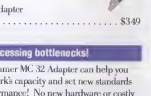

LAN Streamer MC 32 Adapter (92F8942) $859

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Terror at 66 MHz

Is your portable PC actually a deadly airborne weapon?

BY COREY SANDLER

PHOTOGRAPH BY ROBERT CARDY

CAN A 7-POUND computer knock a 500,000-pound jet out of the sky? Ask the major U.S. airlines and they'll tell you it's a distinct possibility. Which is why every single carrier currently bans laptop PC use during take-offs and landings.

Talk to the airline safety bureaucrats, and it's suddenly as if DOS 6.0 has replaced C-4 as the terror weapon of the nineties. The way they figure it, computer-toting accountants are far more dangerous than bomb-toting fundamentalist crazies.

Over the past two years, wild-eyed tales of pilot dread have splashed across front pages nationwide. In each case a PC or some other electronic device supposedly knocked an aircraft's navigational system for a loop. Panicked crews were nearly at the point of scribbling their wills on the backs of flight plans, but when passengers turned off these devices, operation returned to normal.

Are computer-toting accountants more dangerous than bomb-toting fundamentalist crazies?

Are computers really capable of bringing down today's state-of-the-art aircraft, crammed with millions of dollars worth of the most sophisticated electronic gear available? Or is this just pseudoscientific voodoo?

Here's the theory: All electrical devices emit radio frequency (RF) waves, and all commercial aircraft rely on sensitive avionics equipment to monitor certain radio frequencies to help them navigate. If passengers' electronic devices produce RF interference at these critical frequencies with enough signal strength, they theoretically could confuse or disable a plane's navigation gear. Which would be bad, unless your pilot happens to be Charleton Heston.

The vital navigation equipment is normally shielded from such interfering waves. Computers are also shielded—to prevent RF waves from leaking out and causing interference—to qualify for ground-based FCC approval. But PCs aren't the only devices that could possibly produce lethal emissions. Squeeze down any airplane aisle and you'll spot dozens of CD players, handheld games, FM radios, electronic razors, and TVs. These devices often are cheaply made and lack the emission safeguards found in even the least expensive PCs.

Still, PC users should be concerned. No one wants to be responsible for bringing down a 747, especially when they're on it.

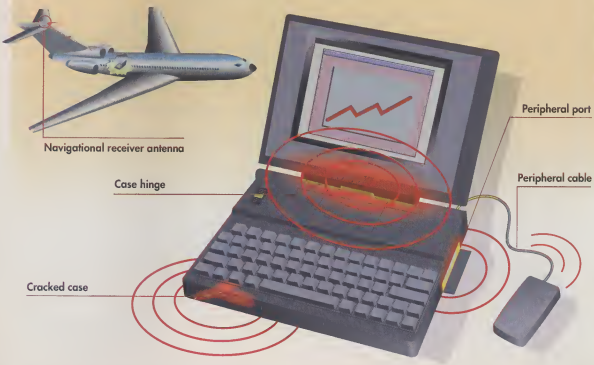
To resolve the issue, we hired one of the country's top electronics emissions experts, reserved time at a leading avionics lab, and shipped in a truckload of laptops and assorted portable electronic devices.

After extensive testing, our results were unmistakable: While in some cases laptop computers do generate *minute* amounts of RF emissions in the critical navigation frequencies, they clearly are *not* the culprits. However, cellular phones and FM radios can indeed produce interference at frequencies and strength levels that could affect navigational equipment. And results can be affected by where the devices are located in the cabin,

ARE YOU USING A LEAKY LAPTOP?

Peripherals, ports, and plain old wear-and-tear make your PC dangerous.

Our tests show that laptops in good working order will not cause navigational havoc. But few laptops remain in factory condition. Emissions can bypass built-in RF shielding through cracks in the case, peripheral cables, ports—even the hinge, resulting in signals that could be picked up by the plane's navigational antennae.



how many devices that are generating the exact same frequency are in use at once, and whether the devices and the avionics equipment are in proper working order.

CRASH COURSE IN SAFETY

Fear of flying is nearly universal. Neither airline safety statistics nor scientific discussions of lift and aerodynamic stability offer much comfort when we are confronted with visions of plummeting helplessly to the ground.

Most of us wonder at one time or another what really keeps the several hundred tons of steel, aluminum, and vacationers safely aloft. It all seems so fragile and precarious to us. So it's no surprise that alleged accounts of electronics-influenced pilot terror hit especially close to home. Consider:

MAY 1992 *At 33,000 feet, an aircraft en route from Houston to New York's La Guardia Airport experiences trouble with its communications radio and asks the flight controllers for a different frequency. When the crew switches over, it hears music on the new channel, and on a third channel as well. A few seconds after a flight attendant asks passengers to turn off their FM radios, the cockpit regains normal communications channels.*

DECEMBER 1992 *A wide-body jet takes off from New York's JFK Airport. In the critical moments after liftoff, the navigational compass goes haywire, forcing the cockpit crew to use backup systems. A flight attendant discovers that a passenger in the first-class compartment, just behind the cockpit door, was using a laptop computer on the ground and continued to do so before and during takeoff.*

JANUARY 1993 *En route from Denver to Newark, New Jersey, a commercial airliner's directional gyros suddenly veer as much as 30 degrees off the correct heading. The flight attendant tours the cabin and finds 25 passengers listening to a football game on portable radios and one passenger using a laptop. After repeated announcements, including a threat by the pilot to have the devices confiscated, the passengers turn off the radios. The gyros then return to the proper heading.*

FEBRUARY 1993 Time *reports that a DC-10 coming in for a landing at New York's JFK Airport "almost crashed when a passenger in first class turned on his portable compact disc player."*

MARCH 1993 *A large commercial aircraft flying over Colorado receives a report from Denver air traffic control that it is 7 miles south of its assigned flight path. The pilot discovers that the aircraft's primary compass is 15 to 20 degrees out of whack. After trying to make corrections in the cockpit, the pilot asks the flight attendant to check the passenger cabin. She reports that a laptop computer with an external battery pack is in operation over the right wing; elsewhere in the cabin, a video game and a calculator are in use. After the devices are turned off, the compass returns to normal operation and remains so for the rest of the flight.*

Stories such as these have set off alarms throughout the worldwide aviation industry. As a result, in June and July of this year major airlines began prohibiting the use of most portable electronic devices (PEDs) during aircraft takeoff and landing. Many airlines ban their use below 10,000 feet. (See "Airline Policy Primer," page 225.) They decided it's better to be safe than sorry, at least until they have proper scientific evidence one way or the other.

Using a spectrum analyzer, KnoxAir avionics manager Jonathan Foulds pinpoints the RF emissions given off by each laptop to determine its potential for navigational interference.

PHOTOGRAPH BY DAVID LUTTRELL

But many experts don't agree about the risk. Jim Boone, director of avionic/flight systems for Boeing, the world's largest aircraft manufacturer, scoffs at the notion of such interference. Boone, whose company has conducted its own tests in response to inquiries from airline companies, is firm: "There is no problem."

Similarly skeptical is Anthony M. Broderick, the FAA's associate administrator for regulation and certification, who points out the incomplete nature of such purely anecdotal scare stories. "Was someone in the lavatory? Was a microwave oven in use? Was the plane properly maintained? We have to recognize that it is possible to have

small variations or fluctuations in one or more instruments on a plane. Before there were laptops, there were electrical and electronic anomalies. We called them gremlins."

Broderick isn't worried. "We do not see a problem from electromagnetic emission, providing you follow the instructions that the airlines have put out, including not to use them [certain devices] during takeoff and landing."

U.S. Representative Bob Carr, chairman of the House transportation subcommittee, also claims there is "little risk." A private pilot and portable computer user, Carr questions the restrictive actions of flight crews: "There are very few pilots who are also radio engineers."

AGAINST ALL ODDS

Just how likely is one of these incidents on your next trip? There are about 10 million commercial flights in the United States each year. If just one person on each flight used an electronic device—a conservative estimate—there would be 10 million opportunities for problems annually.

According to NASA's Aviation Safety Reporting System, a database of more than 43,000 commercial flight incidents, only 39 cases of possible interference were voluntarily reported between January 1986 and July 1993. Of these reports 25 present plausible scenarios involving PEDs. Here's the math: 25 anecdotal and unsubstantiated incidents in a period during which there were about 76 million commercial flights yields 3.33 anecdotal reports per 10 million annual flights. Long odds.

By comparison, the FAA reports that there were 327 reports of near midair collisions in 1992. With approximately 10 million flights that year, an airplane was 100 times more likely to have a near midair collision than run into possible interference from a PED. Of course this isn't much consolation if the one flight that happens to be affected adversely is the one you're on.

In February, the FAA revised the federal aviation regulations (FARs) regarding use of electronic devices on airliners. FAR Section 91.21 allows the operator of each aircraft to determine which devices they believe will or will not interfere with the navigation or communication systems. In effect, the FAA is telling airlines they needn't base their decisions on tests or scientific procedures, but that they can rely on their own opinions.

In response, airline after airline has banned the use of most PEDs—with the exception of medical devices such as pacemakers—at altitudes below 10,000 feet.

"Even though all of the evidence has been anecdotal, they can't turn their back on it," says Mike Rioux, a spokesman for the Air Transport Association of America. "Passengers are making a big deal about their rights being infringed upon and their loss of productivity, but everyone is missing the real point. If laptops are banned under 10,000 feet, we're really talking about only a few minutes of flying time."

This low-altitude ban applies to all nonmedical electronic equipment, but one noncomputer device has

HOW SAFE ARE THEY?

PC/Computing's exclusive test results are in: Laptops have gotten a bum rap.

	Audio Vox PT-300	GE 3-5241D	Panasonic RF-H25	Sony WM-F12	AST Power Exec 4/25SL	Altura 486
	Cellular phone	AM/FM radio	AM/FM radio	AM/FM walkman***	Laptop	Laptop
Measured frequency (MHz)	Varies*	108dBm to 136dBm**	108dBm to 136dBm**	108dBm to 136dBm**	[illegible]	[illegible]
SIGNAL STRENGTH						
3 meters from receiver antenna	–62dBm	–76dBm	–102dBm	–82dBm	–105dBm	–100dBm
12 meters from receiver antenna	–74dBm	–88dBm	–114dBm	–94dBm	–117dBm	–112dBm
30 meters from receiver antenna	–82dBm	–96dBm	–122dBm	–102dBm	–125dBm	–120dBm

*Cellular phones place calls by constantly shifting frequencies—making it difficult to measure signals.
**Frequency varies as radio is tuned across band.
***Acting as FM receiver.

raised particular concern—the cellular telephone. The FCC currently licenses these phones for land use only. Midair use would greatly extend their transmission range and make them more likely to seriously interfere with other cellular devices. The FAA also supports the restriction on cellular phones—but as potential sources of interference to avionics equipment. They can be used only while the plane is on the ground and before taxiing. Phones installed in the planes by the carriers themselves, like the GE Airphone, use different radio frequencies that don't interfere with flight operations.

INTERFERENCE METHODS

How can PEDs interfere with an airline's control equipment? Modern airlines rely on very high frequency omnidirectional radio (or VOR) range for navigation. In the United States, VOR is made up of about 400 ground-based transmitting stations. A receiver on each aircraft receives signals from these stations and determines with considerable precision whether the airplane is moving toward or away from a particular transmitter, and how far to one side or another it is in relation to the chosen heading (one of 360 radial degrees).

To prevent interference, regulatory agencies have sliced up the radio spectrum into clusters of assigned frequencies. Distinct bands of nonoverlapping frequencies are allocated for specialized uses such as television, FM radio, police and fire radio, cellular phones, highway speed-trap radar, and airline navigational radio. These ranges of frequencies are measured in hertz (cycles per second). The higher the frequency, the more hertz.

VOR frequencies begin at 108MHz (millions of cycles per second), just above the top end of the FM radio band, and extend to 117.95MHz. But navigational and FM transmitters aren't the only equipment that can produce radio signals in this frequency range.

Every electronic device—from hearing aids to laptop PCs to cellular phones—gives off RF emissions. Transmitting devices (such as cellular phones and CB radios) are designed to generate strong RF signals, while nontransmitting devices (such as FM radio receivers, CD players, and laptop computers) emit weak RF signals only as a side effect of their main function.

Devices that produce RF waves also commonly generate harmonics—multiple emissions (double, triple, and so on) of the original frequency. The CPUs at the heart of most computers today work at a frequency of between 25MHz and 66MHz, and each PC's timing circuitry gives off mild RF emissions both at these primary frequencies and, to a lesser extent, at harmonics of these frequencies.

So a PC running at 33MHz produces a very weak primary RF signal at 33MHz and even weaker harmonic signals at 66MHz, 99MHz, and 132MHz. While none of these is critical to air navigation, airlines fret that such frequencies could combine with other RF waves to

RF DANGER ZONES [RED] Signal is strong enough and in the right frequency range to cause interference.
[ORANGE] Signal is strong but is in the wrong range, or signal is in the right range but is too weak to interfere.
[BLACK] Signal is weak and in the wrong frequency range to cause interference.

Gateway 2000	IBM ThinkPad 700C	PC Brand ANC-4D33	TI Travel Mate 4000	Zenith Z-LITE 320	Sony D-121 Discman	Nintendo Gamebay
Subnatebook	Laptop	Laptop	Laptop	Laptop	CD player	Electronic game
Not detectable	Not detectable	Not detectable	Not detectable	Not detectable	[illegible]	Not detectable
Not detectable	Not detectable	−110dBm	Not detectable	−110dBm	−100dBm	Not detectable
Not detectable	Not detectable	Not detectable	Not detectable	Not detectable	−112dBm	Not detectable
Not detectable	Not detectable	Not detectable	Not detectable	Not detectable	−120dBm	Not detectable

NOTE: A PED that emits RFs within the range used for aircraft navigation (108MHz to 117.95MHz) could cause interference—if the signal is strong enough. RF strength is expressed as a logarithmic ratio between the emitted signal and 1 milliwatt (dBm). The closer this negative value is to zero, the stronger the signal: A −62 dBm signal is more than 60,000 times stronger than a −110 dBm signal.

Laptop PC users shouldn't be made to feel like terrorists or air pirates.

produce a signal strength equal to or approaching the strength of navigation frequencies. All computers in this country must pass stringent FCC tests to demonstrate that they do not exceed controlled RF emissions levels. The FCC's standards, however, apply to the use of the device on land only. (For more information about FCC certification, see "Making the FCC Grade," page 218.)

The emissions produced by PEDs, including those from PCs, vary in frequency and signal strength, the two variables that determine whether a device is likely to interfere with aircraft navigation. A device that gives off powerful RF signals won't interfere with an airplane's VOR if the signal and its harmonics are at a frequency below 108MHz or above 117.95MHz. In addition, a device that gives off signals in the VOR range may not cause VOR interference if these signals are extremely weak.

Without test-based evidence, there's little hope of getting to the truth and exonerating the devices that are actually innocent. Unfortunately, the most recent exhaustive scientific tests of PEDs' effects on aircrafts were carried out in 1988—ages ago in the rapidly changing world of technology. The Radio Technical Commission for Aeronautics (RTCA) will initiate a new round of tests later this year, with its report due in 1994.

THE PC/COMPUTING TESTS

PC/Computing is the first computer magazine to take an active role with the RTCA's special test committee, and we are strongly committed to this study. (See "Still Up in the Air?" page 226.) However, because the results of RTCA's study will not be available until next year, we decided to undertake a series of rigorous lab-based tests ourselves. Our goal was to measure the radio frequency emissions from a wide selection of PEDs and identify their potential for causing navigational interference.

We tested a dozen laptop and notebook computers from leading companies, such as AST, Altura, Gateway, IBM, Texas Instruments, Zenith, and six others, as well as from smaller, less well-known manufacturers. We also ran tests on non-PC devices such as cellular phones, CD

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players, computer games, electronic calculators, and AM/FM radios. (For a partial list of the devices we tested, see "How Safe Are They?" on page 214.) All tests were performed by avionics experts at KnoxAir, a highly-respected FAA-approved avionics service facility in Knoxville, Tennessee.

We used a calibrated spectrum analyzer to measure the amount of emissions given off by each device at the frequency utilized by an airliner's navigational equipment. We further studied the potential for interference by observing the effect on actual navigational radio when subjected to such emissions. And we performed a series of real-world simulations to zoom in on factors such as signal attenuation (weakening) and the use of multiple devices at one time. Our procedures were based on the RTCA's published study, and on FCC certification guidelines for measuring personal computers' RF emissions. (For more details on testing procedures, see "Running Interference," page 220.)

FINAL RESULTS

After several weeks of testing, *PC/Computing*'s avionics experts concluded that it was highly unlikely for laptops and most PEDs to cause navigational interference. Of the devices tested, nearly half produced signals so weak they couldn't be measured above the baseline noise present on all radio frequencies. Although RF signals could be measured when these devices were placed directly adjacent to the spectrum analyzer, as soon as these devices were moved beyond 12 to 18 inches from the receiving antenna, the emission levels fell below the threshold of noise.

In general, we were unable to produce any real VOR interference except when we used FM receivers and cellular phones, and when we placed other devices unrealistically close—within 6 to 12 inches of the VOR receiver antenna. The standard regulation measurement distance used by the FCC and RTCA is 3 meters.

We did detect very low RF levels when we placed each of the laptops within a few inches of the receiver antenna. (IBM's ThinkPad 700C distinguished itself by emitting significantly lower RF's than did all the other models we tested.) When we placed the laptops at regulation distance from the spectrum analyzer, we were able to measure tiny RF emissions from five of them, three of which registered in the VOR frequency range. But our avionics experts concluded that the signals from these three laptops were far too weak to cause any significant VOR interference.

Airlines claim that external pointing devices and other laptop peripherals are especially suspect because

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their cables can act as antennae. Several of the airlines we surveyed ban the use of peripherals entirely. But the three pointing devices we tested—the Logitech TrackMan, the Kraft UTrack, and the Microsoft Ball-Point Mouse—did not independently produce any measurable RF emissions at 3 meters.

Radios, on the other hand, did emit strong signals—and within the frequencies that could cause interference. The GE radio's emissions were among the strongest signals we found. As with all FM radios, this receiver produced peaks of radiated energy that changed as the receiver frequency was changed. The Panasonic radio produced similar, but slightly weaker signals. And, as our experts predicted, the cellular phone (which is banned during flight by all airlines) produced the strongest signals—over 60,000 times as strong as those produced by the laptops.

The Sony Walkman, operating as an FM receiver, produced significantly stronger emissions than all laptops and, more importantly, at frequencies used by aircraft navigation. On the other hand, When the Walkman was tested as a cassette player we could measure no emissions at 3 meters. The Sony Discman's emissions, similar in strength to the laptop's, fell just above the VOR band. We did not detect any significant emissions from a Nintendo Gameboy or Hewlett-Packard calculator when placed 3 meters from the spectrum analyzer.

REAL-WORLD CONCERNS

While our tests yielded significant results, they were performed under strict, lab conditions. On actual aircraft, signals are weakened by aircraft shielding, the airframe itself, windows, seats, and even passengers' bodies between the PED and the receiving antenna.

To test these attenuating effects in a typical cabin, we placed aluminum aircraft shielding between the VOR antenna tuned to the local VOR transmitter and a Panasonic FM radio at close range. Before the shielding was applied, gauges indicated that the radio was indeed interfering with the proper VOR operation. As soon as the shielding was in place, all interference ceased.

Because it is rare that only one of each kind of device would be in use on a typical flight, we performed additional tests using multiple laptops to simulate a real flight situation. Cumulative effects are difficult to predict

MAKING THE FCC GRADE

In this case, a B *is worth more than an* A.

From VCRs to clack radios, laptaps ta watches—if it's digital, it hos ta be certified by the FCC. Mare needless government bureoucracy? Perhaps. But it's also a necessity to prevent interference with crucial emergency services (like police dispotches) ond commercial broodcasting. Every digital device earns either o Class A ar o Closs B rating. Closs A, a less stringent rating, limits the device ta business use, while Closs B certifies it far bath business and hame use.

While FCC tests ensure that cazying up with yaur loptap wan't put static an your neighbar's big-screen TV, they dan't moke the same guarontee far an oirplane's navigational equipment. While FCC certification wan't indicate a loptap's risk during o cammercial flight, the FCC's Class B rating daes push manufacturers to design partables with minimol radio noise. Same campanies are pushed further thon athers. Take IBM's ThinkPad 700C, which gove aff the lawest emissians af any laptop we tested when placed just o few inches from the receiver antenna. IBM, in fact, has several labs whase sale purpase is ta analyze praduct designs for law electramagnetic emissians.

Shielding, hinges, and ports all make a portable computer a permeable computer.

Key ta IBM's—and any ather manufacturer's—emissian-cantral effarts is the laptop's shielding, usually o metallic caating inside the cose. Na two shieldings, it seems, are alike. Nat only daes quality and canstruction vory wildly amang manufacturers but the shielding weakens with oge. In fact, an average laptap lases obout half af its shielding within os little os twa years, accarding ta CKC Labs, which tests far FCC certificotion. Paar case design and high humidity cause even faster deteriaratian.

But shielding isn't the only factor. Manufacturers olso have ta cantend with secandary rodiated emissions, where signals fram one internal campanent, such os a madem, are amplified by onather internal device, such as a CPU. A loptap's vulnerability ta leoks doesn't stap there. Weak case seams, hinges, ond peripheral parts all con make o partoble computer o permeable camputer. —*CHRISTINE GRECH*

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RUNNING INTERFERENCE

PC/Computing's tests pinpoint which devices can threaten airline navigation.

To many of us, a long flight is PC heaven—a chance to bang away on a notebook without phone calls or other interruptions. We'd much rather have an extra hour of battery life than an extra pillow or bag of nuts. Logging all that air time without a PC is unthinkable, but so is the possibility that boating up could bring the plane down.

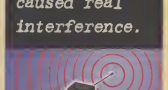
Every U.S. airline currently restricts in-flight PC use in some way. Are they at all justified? *PC/Computing* decided to resolve this question with extensive testing by qualified experts in an FAA-approved avionics lab.

We began with a calibrated IFR FM/AM 1000S communications monitor/spectrum analyzer, a tunable radio frequency (RF) receiver with oscilloscope and graphical display that can show detected signals. We attached a receiving antenna to that analyzer, designed to detect the very high frequency omnidirectional radio (VOR) range used for navigation. Using this equipment, we tuned to the entire range in 0.05MHz increments, noting the baseline noise levels and outside signals present at each frequency. These tests gave us a measure of outside noise that we could use to determine the actual interference (if any) of each device.

Initially, we placed each of our test devices on a horizontal surface 3 meters from the receiving antenna, and we tuned the spectrum analyzer to 108MHz (the first frequency in the VOR range). We then changed each device's plane of orientation relative to the receiver antenna. This test reveals not only how emissions vary when you hold and use each device in your lap or place a device up to your ear, it also pinpoints peak emissions along those shifting angles. We followed this procedure along the length of the VOR spectrum, up to 117.95MHz.

After testing at 3 meters, we used the inverse-square law of physics to calculate signal levels at 12 meters (the approximate distance from the navigation antenna to the rear of the passenger cabin in a 727-200 aircraft and 30 meters (the approximate distance from the navigation antenna to the front of the passenger cabin in a 727-200). We verified our calculations by using a signal generator to produce a signal at 3 meters, 12 meters, and 30 meters. The results proved to be consistent.

In our tests, only cellular phones and FM radios caused real interference.



We detected two types of RF signals. Those emitted by FM radios have measurable peaks and can threaten aircraft navigation if they fall within the VOR range. The other type of signals, emitted by all of our tested laptops, produce no distinguishable peaks. The overall effect: an increased baseline noise level.

So what does all of this talk about RF signals mean for users of electronic devices? You can determine what threat these portables pose by comparing our results with the definition of interference laid down by the Radio Technical Commission for Aeronautics (RTCA). According to the RTCA, a signal interferes when it sets off a navigational bearing change of one-half degree or more, an audio voltage change of 3 decibels or more, or when it flags that the VOR antenna is receiving an unreliable signal. In our tests, only cellular phones and FM radios caused real interference.—*TOM BADGETT*

because of the varying distances between the devices and the antenna, and because of the varying presence or absence of materials that absorb the signals.

However, the results of our multiple-device tests were eye-opening. When ten laptops were operating at one time, our results were the same as if only one laptop had been in use. We did not detect an increase in the signal strength, nor was this signal located in the VOR band. Subsequent tests—where we increased or reduced the number of laptops in use by turning them on or off one at a time—likewise produced no interference. According to our avionics experts, we did not see an increase in signal strength because no two laptops were producing RFs at *exactly* the same frequency.

We also tested for this scenario using the worst offenders in our previous test, FM radios. This time, when we tuned two radios to the same frequency, VOR interference increased significantly. In a worst-case scenario—when the two radios were located equidistant from the VOR—the effect was doubled. Applying this result to last January's Denver-to-Newark incident (where 25 passengers were tuned to the same football game) and ignoring the effects of varying distance within the cabin, the cumulative effect of 25 receivers could have produced a combined signal nearly 34 times stronger than VOR signals—interference that could have penalized these football fans a lot more than a few yards.

Finally, because distance can greatly affect potential

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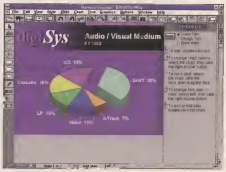

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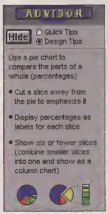

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interference, we measured how far an offending device could be positioned from the avionics antenna and still have a harmful effect. The farther away the PED is located from the aircraft's VOR receiver antenna, the weaker the received signal. Because the strength varies inversely with the square of the distance, doubling this distance results in a signal one-quarter as strong as the original. A device a few feet from the tail-mounted antenna is potentially far more dangerous than one several rows forward.

However, our tests showed that an FM signal in the VOR range—in this case from a Sony Walkman operating as an FM receiver—was still significantly strong at a distance of 10 meters. In our experts' opinion, that's a little too close for comfort. On a Boeing 727, a passenger seated at the very rear of the cabin is about 12 meters from the navigation antennas. (For test highlights, see "How Safe Are They?" on page 214.)

FINAL ANALYSIS

Based on *PC/Computing*'s tests, as well as on those performed by the RTCA, we found that the likelihood of a passenger's laptop causing navigational interference is extremely slight. But this conclusion is based on two assumptions: The laptop must be in the manufacturer's original condition, and the aircraft's avionic equipment must be in proper working order.

Because of stringent FCC requirements, most laptops are relatively emission-free when they are shipped from the factory. But if users modify their computers or damage them through mishandling or extreme wear and tear, all bets are off. A crack in the case or an open chip socket or connector port can act as a radiator for internal signals. Although the laptops and other electronic devices we tested were not all brand new, they were all in excellent condition. (See "Making the FCC Grade," page 218.)

Our conclusions are also based upon existing avionic technology. A new generation of commercial "fly-by-wire" aircraft, led by the Airbus A-320, replaces today's mechanical and hydraulic linkages with digital ones. The FAA has mandated that all such planes be able to withstand a high-intensity radiated field. The additional shielding required for this will presumably cut down on potential interference from all PEDs.

After analyzing the results of our lab tests, our avionics experts agree that the RF signal strength emitted by laptop computers and most of the other devices we tested falls well below the level that would interfere with properly installed and maintained navigational and communications equipment on today's commercial airliners. The potential problem devices we uncovered were not computers but rather cellular telephones (which are banned in flight) and portable FM radios.

AIRLINE POLICY PRIMER

Your mouse or your life? Carriers make you choose.

All the major airlines let you fire up your laptop in flight—except for about 10 minutes during takeoff and landing. But many ban the use of any peripherals while aboard the aircraft. Airlines vary their policy regarding which other PEDs may be used during noncritical flight times.

	Laptop Peripherals Allowed?	Cassette Players Allowed?	CD Players Allowed?	Cellular Phones Allowed?	Electronic Games Allowed?	FM Radios Allowed?	TVs Allowed?
Alaska	●	●	○	○	●	○	○
American	●	●	●	○	●	○	○
America West	●	●	○	○	●	○	○
Continental	●	●	●	○	●	○	○
Delta	○	●	●	○	●	○	○
Northwest	○	●	●	○	●	○	○
Southwest	●	●	●	○	●	●	●
SwissAir	○	●	○	○	●	○	○
TWA	●	●	●	○	●	○	○
United	●	●	●	○	●	○	●
USAir	●	●	●	○	●	●	●

● YES ○ NO

STILL UP IN THE AIR?

RTCA study to determine in-flight electronic device standards.

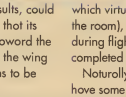
How safe is your laptop? Or your CD player? Hard to say, really, since your electronic companion—whether it's a Compaq or a Gameboy—could have been dropped one too many times to be emission-safe. But how would you know? You have no guidelines to determine whether your trusty Toshiba is airway-approved or that the sleek subnotebook you've been eyeing will be allowed out of its carrying case. Sound confusing? Here's some good news.

The Radio Technical Commission for Aeronautics (RTCA), a not-for-profit organization, is reinstituting an extensive program to provide testing guidelines and suggest new standards for what you can safely use in the air.

The RTCA began its investigations in 1988. Its conclusion at the time: Only a weird combination of circumstances could potentially threaten air safety. What combination? Well, say a passenger just happened to be sitting in a window seat in the row closest to the plane's navigational antennas. That passenger, eager for the latest pennant results, could hold up his or her FM radio in such a way that its peak signals were aimed out the window toward the wing. Those signals could then ricochet off the wing to the navigational receiver, which happens to be between ground signals that it would otherwise be receiving. Now that's a weird combination that could indeed spell interference.

Despite the unlikelihood of this scenario, the RTCA recommended that digital gadgets (including your laptop PC) not be used during takeoff and landing, when a plane is especially vulnerable to ground interference from such sources as FM broadcast transmitters. Still, the RTCA did recognize that something had to be done. So it recommended that the FCC create a new, more stringent classification that would allow the use of digital devices during flight, and that the FAA set new regulations allowing their use.

How do you know if your trusty Toshiba is airway-approved?



Five years later, no federal agency has acted upon these recommendations. But at the FAA's request, the RTCA is reopening its investigation. A special committee, with computer industry members such as Apple, IBM, Sony, and *PC/Computing* has been established to oversee the study. While we're still in the preliminary stages of testing, we know we'll test 50 electronic devices, including video cameras, portable television sets, pagers, CD players, radios, and laptops. We'll test the devices in three separate screen rooms (lab facilities that are completely enclosed in fine copper mesh, which virtually eliminates stray signals from outside the room), in ground-based aircraft, and finally during flight on commercial aircraft. The study will be completed by the end of next year.

Naturally we can't predict the results, but we do have some expectations based on the tests you've seen in these pages. When all is said and done, *PC/Computing* will join its industry colleagues to present your case before Congress. Stay tuned for updates on our progress.—*CHRISTINE GRECH*

Other areas of concern are the operating condition of both the devices and the avionics gear, as well as the unlikely multiplicative effect of dozens of individually weak devices working at the same exact frequency, which could theoretically produce a combined signal strong enough to influence instruments.

While our initial lab tests did not conclusively rule out laptop PCs as a source of in-flight interference, the results strongly suggest their innocence. Even in situations where multiple laptops are in use, we found no potential for interference. We look forward to the upcoming RTCA round of testing and we will report these results as soon as they are available.

Although the current airline-imposed restrictions are not overly severe (it takes as few as 3.5 minutes to reach 10,000 feet after takeoff) and we applaud the airlines' concern for our safety, we urge the industry to consider our results and expedite other tests to clear the air. All of our evidence exonerates in-flight computers as navigational hazards, and points to non-PC devices such as radios and telephones as potential culprits. Laptop PC users with equipment that is in proper working order shouldn't be made to feel like terrorists or air pirates.

Corey Sandler was the first executive editor of PC Magazine *and is the author of more than 40 books. Tom Badgett, who assisted with the lab tests, has been technical editor of several national computer magazines. A former broadcast technician, he is a licensed pilot. Additional research by Anita Dennis and Christine Grech.*

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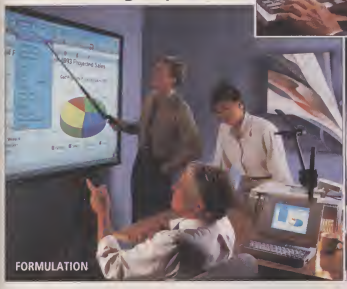

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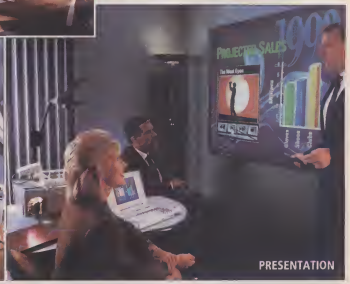

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FAST AND EASY FAXES

Tired of the fax-queue blues? Then plug in to a fast fax modem with easy-to-use software—and boost your productivity.

BY PRESTON GRALLA

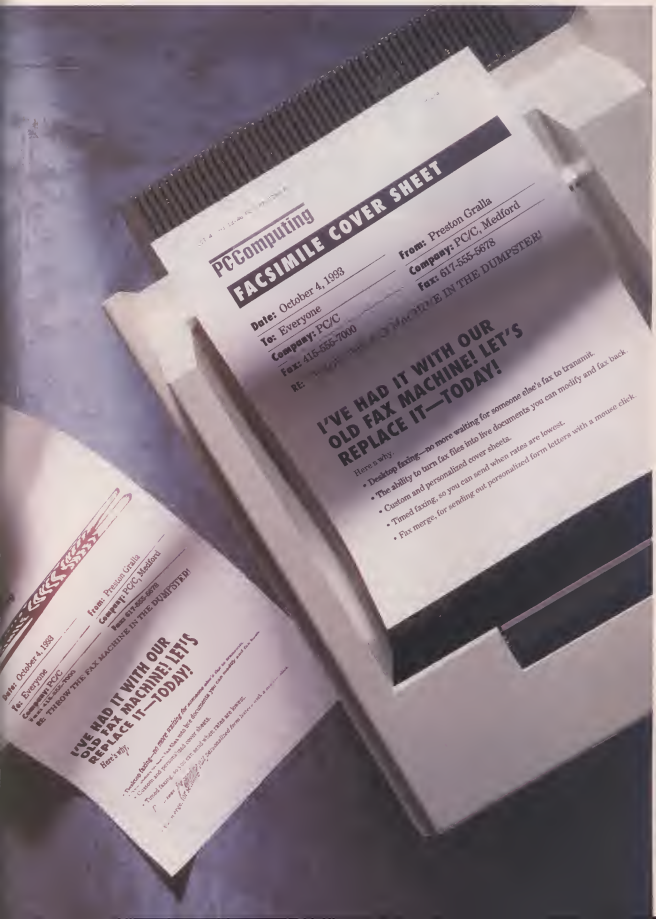
Throw your fax machine in the dumpster. Do it today. Because for every day you delay replacing it with a high-speed fax modem and no-hassle fax software, you're wasting money and losing time. The right combination makes you instantly more productive. Use it, and no longer will you have to bounce around the office like a human pinball, from your desk to the printer to the fax machine—fax from your keyboard, as easily as you print. Don't worry about losing faxes, either, since you can convert faxes to text, index them, and quickly locate a key phrase. Save time by broadcasting a fax with push-button ease—and save money by faxing when rates are low.

To help you find the best software/hardware combination, we tested eight leading fax programs in our usability labs, and we put 19 high-speed fax modems through a rigorous performance gauntlet. We've found the perfect replacement for that clunky, time-wasting fax machine. Now if you really have to hang out somewhere, try the water cooler.

Featuring the Fax

232 SOFTWARE
8 full-featured Windows fax packages that put you in control.

248 HARDWARE
19 fax modems that send and receive faxes with laserlike speed.



PC/C Quarterly BY MAIL CHANNEL

FAX AT YOUR FINGERTIPS

Your fax software holds the key to convenient and effective communications. Which packages are most usable?

The trouble with the good ol' fax machine is that it requires a human being to carry paper from one place to another. From the printer to the fax machine. From the fax machine to the copier. If you're the human being sending the fax, you've worn a path in the carpet between your office and the fax machine. Fax software frees you from this forced march by eliminating paper from the equation. Instead of converting pixels to dots on paper and then scanning them into bits, fax software sets up a direct line of communication between your PC and someone else's fax device.

Choose the right software, and you recapture enormous amounts of time—composing and sending 50 faxes in the time it used to take to walk down the hall to the fax machine. And on the receiving end, you get crystal-clear pages that you can file, retrieve, print, or zap with one mouse click.

Of course, you could stick with the fax software that came with your fax modem. But most packages just plod along, doing little more than the bare minimum. To reap the business benefits of a PC-based fax system, you'll want previewing, annotation, cover-sheet creation, fax merge, OCR, and broadcasting—all the features you'll find in full-strength fax software.

To help you find the best software, we measured eight Windows fax packages against three sets of business needs. And we also found an overall winner to conquer a variety of fax demands.

Some people—light faxers—deal with just a fax or two a day and need a package that lets them get the job done quickly and easily. Choosing and creating cover sheets must be a snap, and there's no room for hard-to-use features.

Frequent faxers keep that fax line humming all day long and have no time to dig around in search of fax numbers or those important documents they just received. Broadcasting, management, and powerful phone-book features are a must.

And then there are the gotta-have-it-*yesterday* types for whom the fax is an art form—they need everything the frequent faxer does, and then some. These demanding faxers scan complex documents into the systems for editing, mark up received faxes and send them back for changes, or use fax systems like word processors—to merge documents with mailing lists so that every fax has that personal touch.

No matter which group you find yourself in, your fax software must be easy to use. We've done the dirty work for you, putting the eight programs through extensive testing in our Usability Labs. We'll tell you which fax software meets your high standards, based on your needs.

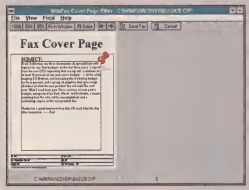
Eight Fax Software Finalists

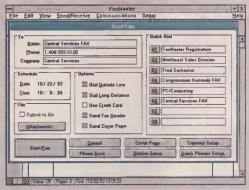
- Caere FaxMaster
- Delrina WinFax Pro
- Eclipse Fax
- Intel Faxability Plus/OCR
- Smith Micro QuickLink Gold
- SofNet FaxWorks Pro
- Trio DataFax
- ZSoft UltraFax

The Usability Challenge: Only Two Survived

Delrina and Caere meet the standard, but the rest have a long way to go.

PC/Computing's Usability Lab put eight Windows fax packages through a suite of real-world tests, asking testers to create cover pages, route incoming faxes to a printer, and more (see "Usability Notes" on page 245). Two packages, Delrina WinFax Pro and Caere FaxMaster, stood out, thanks to their intuitive interfaces for accomplishing quick faxing chores.





PCComputing USABILITY APPROVED

Score: 94.3

DELRINA WINFAX PRO

Testers gave WinFax Pro uniformly high marks for everything from cover-page creation to fax scheduling. Intuitive button bars and easy-to-use fax logs and phone books make this the most usable fax software we tested.

PCComputing USABILITY APPROVED

Score: 84.7

CAERE FAXMASTER

FaxMaster gave WinFax Pro a usability run for the money. Testers liked the way FaxMaster lets you send a quick fax—they rated it tops for sending quick, single-page memos. Overall, FaxMaster proved to be simple and intuitive.

OTHER CONTENDERS

Testers stumbled over basic fax tasks.

ZSOFT ULTRAFAX
Score: 76.8
Low rating for cover-sheet customization and only a moderate overall ease-of-use rating.

INTEL FAXABILITY PLUS/OCR
Score: 76.2
Difficulties with both cover-sheet creation and multidocument fax sending.

ECLIPSE FAX
Score: 74.9
Low ratings for multidocument fax sending, cover-sheet creation, and overall ease of use.

SOFNET FAXWORKS PRO
Score: 69.4
Low scores for multidocument fax sending, cover-sheet creation, and overall ease of use.

SMITH MICRO QUICKLINK GOLD
Score: 69.1
Several testers found it nearly impossible to send a multidocument fax—some failed altogether.

TRIO DATAFAX
Score: 52.7
Low scores for almost every feature we tested and for overall ease of use as well.

PC/COMPUTING DECISION MAKER

Which fax software is right for your needs?

1. Choose the scenario that matches your business needs.	2. Choose the most important factor.	3. What else is important?	4. For your needs, the best product to buy is . . .
Light faxing	Fax sending	Preformatted cover sheets	Delrina WinFax Pro
		Faxes of selected text or graphics	Trio DataFax
	Fax receiving	Sophisticated viewing features	Delrina WinFax Pro
		Easy-to-use receive log	SofNet FaxWorks Pro
Frequent faxing	Fax sending	Multifile sending	SofNet FaxWorks Pro
		Easy addressing	Delrina WinFax Pro
	Fax management	Send and receive logs	Delrina WinFax Pro
		Quick fax locating	SofNet FaxWorks Pro
Complex faxing	Annotation	Graphics library creation	Eclipse Fax
		Graphics file import	Delrina WinFax Pro
	Custom cover sheets	Optical character recognition	Caere FaxMaster
		Fax merge	Delrina WinFax Pro

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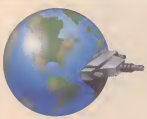

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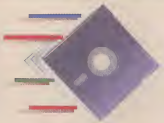

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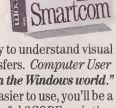

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LIGHT FAXING

IT'S JUST ONE PAGE. BUT IT absolutely, positively has to be there in the next five minutes, or you can start faxing your résumé out instead. You've got a word processing file, a fax number, and the beginning of an ulcer. Don't panic. Just pull down the print menu and let your fax software take care of everything else.

QUICK AND EASY SENDING You want to send a fax in seconds. Who wants to fuss with cover sheets? A library of predesigned cover sheets makes the process a breeze. Of the packages we reviewed, WinFax Pro, FaxWorks Pro, UltraFax, and DataFax include libraries of cover sheets, but not all are implemented equally well. Eclipse Fax includes cover sheets, but not in libraries.

WinFax Pro stands out with its large collection of 101 easy-to-customize cover sheets. You can type a note directly on the cover sheet, a feature that's unique to WinFax Pro—all the other fax programs force you to type your note in a box, so you can't see it on the cover sheet until after it's faxed.

FaxWorks Pro, Eclipse Fax, and DataFax let you browse through thumbnails of their much smaller collections of cover sheets. UltraFax and DataFax can display a list of cover pages with descriptions, but to see thumbnails, you need to go through an extra step—double-click on the name of the cover sheet to see the thumbnail. UltraFax's cover-sheet collection is impressively large, but you can't customize each one as easily as you can with WinFax Pro. FaxMaster has no real cover pages—it merely allows you to use a text file and attach a logo to the top. Eclipse Fax has a small number of cover sheets with limited viewing and customizing features. Neither Faxability Plus/OCR nor QuickLink Gold has a library of cover sheets.

DataFax is the only program that lets you capture and fax any portion of a Windows screen. If many of your faxes comprise pieces of memos, spreadsheets, or maps, DataFax is a winner for quick outgoing faxes. Otherwise, WinFax Pro combines the largest collection of cover sheets with the functionality for easy viewing, customizing, and note writing.

VIEWING FROM EVERY ANGLE How do you shuffle through a 20-page fax after your fax modem finishes its work? Use an electronic magnifying glass. The best fax software packages let you see pages at different zoom levels, jump to inside pages instantly, and see all pages in the fax at once—just as if they were printed on plain paper. WinFax Pro has the most complete set of viewing features. It can show a single page, two pages at a time, or even thumbnails of every page. Zoom levels include 25 percent, 50 percent, 100 percent, and a unique "miniature view" that lets you move a small window around a thumbnail of the entire page so that you can zoom in on any area.

Stepping up next is UltraFax. It's not as simple to use as WinFax Pro; it doesn't have the latter's intuitive icon bar, for example. But in some ways its viewer is more powerful than WinFax Pro's. For example, it allows you to set the zoom level to any percentage between 10 and 600; you can also use one of eight preset levels. You can magnify any portion of the fax and view it in a resizable window.

Eclipse Fax's viewer is snappier than those of WinFax Pro and UltraFax—it brings images onto the screen especially fast—but it's more difficult to use. Its icons aren't as accessible, and it can't show as many pages at once. Like UltraFax, WinFax Pro, and FaxWorks Pro, Eclipse Fax has a "cleanup" feature that smoothes rough edges on received images so that they're easier to read. Eclipse Fax and FaxWorks Pro both let you outline a rectangular area on the fax and zoom in on it.

FAX LOGS When you need to find one fax in a thousand stored on your hard drive, you appreciate a simple, accessible fax log. All the fax programs have logs that include details like date and time received and the sender's phone number, but only FaxWorks Pro and FaxMaster automatically

Best Choice for Light Faxing: Delrina WinFax Pro

For no-muss, no-fuss faxing, WinFax Pro is the clear winner. You get great cover sheets and a powerful viewer, and you can type right on the cover page.

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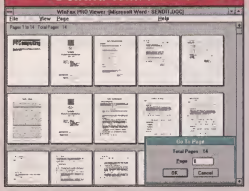
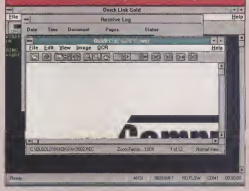
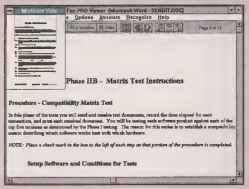


WinFax Pro's well-organized fax sorter lets you see every fax page at once and quickly jump to the one you want.

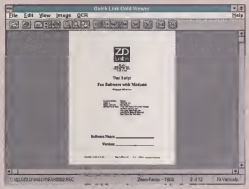
Smith Micro QuickLink Gold



When you initially view a fax in QuickLink Gold, the program plunges you into an unhelpful close-up of the first page.



The Miniature View option displays both a thumbnail of the entire page and a full-screen view of a selected piece of it.



If you want to jump to a specific page, QuickLink Gold makes you change to full-page view and scroll one page at a time.

include a thumbnail view of the fax itself in the log. (The other programs require a second step to display thumbnails.) FaxWorks Pro's log lets you browse thumbnails, zoom in on portions of the thumbnail, or grab one page out of a large fax transmission—without ever leaving the fax log.

FaxMaster takes the thumbnail idea one step further: Its entire log is essentially made up of thumbnails. Each entry shows the top portion of the cover page in good detail—you can see up to six cover pages at once onscreen. But FaxMaster's log gives few details about the fax itself. It lists phone number, how many pages, when the fax was received, and the resolution. But you can't see any inside pages, the duration of the call, or the size of the received file.

WinFax Pro makes you click on a button to see thumbnails of faxes you've sent and received; the default log shows an assortment of information such as the date and time of the call, number of pages, transmission speed, and optional keywords. Of the programs that don't automatically include thumbnail views, WinFax Pro is tops, but if quickly tracking the faxes that you send and receive is crucial, you'll want either FaxWorks Pro or FaxMaster.

FREQUENT FAXING

IT'S 9 A.M. IN NEW YORK. You've got to read yesterday's reports and fire off the day's marching orders while the L.A. crew's still stuck in traffic. Don't reach for that fifth cup of coffee—why not let your fax software take over? It can send, receive, and sort through all those faxes. And it never needs a shot of caffeine.

SMART PHONE BOOKS Where's that number? When's the best time to call? Let your software do the dialing. A good fax package is smart enough to track names and numbers and tell you the best time to send faxes across the country or overseas. And it should link to external data files so you don't have to start a new phone list just for faxes.

Unfortunately, fax software has a way to go before we see the perfect phone book. DataFax, UltraFax and WinFax Pro are the best of an imperfect lot, thanks to a few useful features. DataFax not only gives details on people's names, companies, and fax numbers, but it also tracks the number of faxes sent—successfully or otherwise—to each person in your phone book. It also cuts costs by limiting your ability to send faxes when peak rates are in effect.

UltraFax also lets you attach specified fax-send times to each entry in the phone book. But unlike DataFax, UltraFax lets you set only one default transmission time for each entry instead of one for each day of the week. QuickLink Gold's and Ultra-Fax's phone books let you schedule a direct binary-file transmission if the fax modems on each end allow for it.

WinFax Pro's phone book stands out for its usability and powerful search tool. Its simple-to-follow 3-D buttons make it easy to create groups, add and delete entries, and search for the entry you want. Only Eclipse Fax and WinFax Pro provide automatic links to phone entries in popular personal information managers. DataFax lets you use dynamic data exchange to connect to a PIM's phone book.

TWO FILES, ONE FAX You've written the memo. You've crunched the numbers. You've designed the chart. You're ready for multiple-document faxing. Unfortunately, the fax software we reviewed isn't quite ready for you. Most march you through a two-step process. First, you have to open the file in the program that created it and convert it to fax format with the fax print driver. Next, you have to connect the converted files into one ready-to-fax document.

WinFax Pro lets you quickly send the files that you've converted as one fax. You can categorize files, attach descriptions and keywords, view thumbnails, and, using WinFax Pro's annotation tools, modify any of the files before sending them.

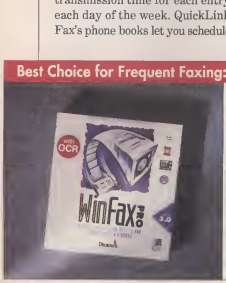
FaxWorks Pro has similar capabilities, and it also adds a few winning ideas of its own. Its well-designed log makes it a snap to find documents, since it allows you to search using multiple keywords and Boolean operators (AND and OR). FaxWorks Pro is also the only program that compresses attachments to conserve hard disk space.

FAX MANAGEMENT You want your faxes filed neatly, not stuffed into some sort of electronic shoe box. For sheer organizational muscle, WinFax Pro and FaxWorks Pro are the standouts. Both have excellent logs that allow for easy searching, archiving, compression, and fast retrieval.

WinFax Pro lets you customize your log to show elements like the time, date, or billing code. In addition, WinFax Pro's powerful search engine lets you easily find the fax you want by searching by any field, not just by keywords. You can also compress and archive sent and received faxes.

FaxWorks Pro is the only package that lets you search using Boolean operators. And, like WinFax Pro, it includes easy-to-set-up file cabinets where you can create folders for sent or received faxes. This makes fax organization and retrieval virtually effortless.

Best Choice for Frequent Faxing: Delrina WinFax Pro



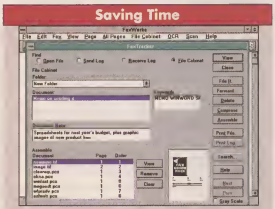
A great phone book, a top-notch fax-management system, and multifile fax capabilities make this the top choice for anyone whose fax line never quits.

WinFax Pro • $129 • Delrina • 895 Don Mills Rd., 500 Two Park Centre, Toronto, Canada M3C 4W3 • (800) 268-6082
Circle Reader Service No. 748

The Fax Software Payoff

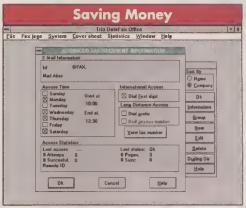
Smart features you can't find in any fax machine.

Saving Time

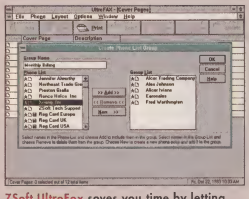


SofNet FaxWorks Pro's FoxTracker does on excellent job of ossembling multidocument foxes to be sent in o single transmission.

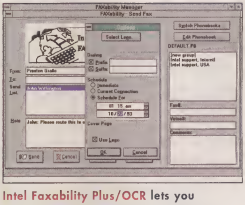
Saving Money



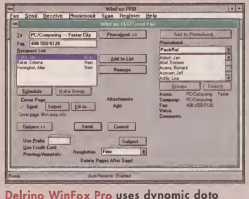
Trio DataFox lets you schedule the leost expensive time to send faxes for each of the entries in your phone book.



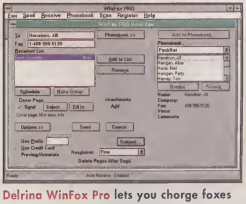
ZSoft UltroFox soves you time by letting you group nomes ond then automotically fox to everyone on the list.



Intel Faxability Plus/OCR lets you schedule foxes by giving you the option to specify transmission dotes ond times.



Delrina WinFox Pro uses dynomic doto exchonge to occess phone books from personol informotion monogers.



Delrina WinFox Pro lets you chorge foxes to o credit card, preventing those huge hotel phone bills when you're on the rood.

COMPLEX FAXING

YOU KEEP YOUR FAX LINE humming 18 hours a day—and that's a slow day. You've just received a barrage of faxes from around the world. Your challenge: Stitch them into one outbound fax, mark it up with do-it-now comments, add your signature, and blast it back to everyone. Before London goes home for the day.

ANNOTATING FAXES The fastest way to deal with an incoming fax is to scribble a note on it and fax it right back. Annotation lets you bypass the paper trail; you use text tools to make your mark onscreen. You can even add a digitized version of your signature. Faxability Plus, FaxMaster, and QuickLink Gold don't offer annotation, and even the packages that do could stand some improvement.

As the first fax package to offer annotation, Eclipse Fax established the basic feature set that other programs emulate, including the ability to draw lines, circles, and rectangles and to use system fonts for typing comments. This capability is standard in all the packages with annotation, but Eclipse goes one step further. It lets you index graphics that you plan to reuse—like your signature, initials, or logo—and quickly place them on a fax. The program also lets you rotate your type in any direction.

If you need easy access to annotation tools and plan to import a wide variety of graphics file formats, look to WinFax Pro. It doesn't let you rotate type like Eclipse Fax, but it directly supports ten file formats—more than the other programs do—and gives you extra power by letting you scale imported graphics to fit.

UltraFax's handy eraser tool lets you zap part of a fax or annotation with ease, and its floating toolbar makes annotation tools especially accessible. You can directly import several types of graphics files, but not as many as you can with WinFax Pro. UltraFax doesn't support rotated type.

A nifty feature in FaxWorks Pro is its capability to save up to six "fast graphics" on a menu, which you can quickly paste into a fax. Its floating toolbar lets you rotate type, but its graphic file support isn't nearly as extensive as WinFax Pro's.

DataFax has the most basic annotation capabilities of the bunch—it lets you add text and draw lines, boxes, and circles. Its only notable annotation feature is an eraser tool like UltraFax's.

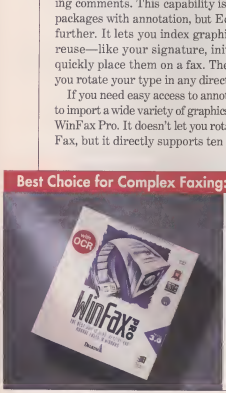
CUSTOM COVER SHEETS AND FAX MERGE You don't send the same fax to everyone, so why send cookie-cutter cover sheets? WinFax Pro makes it easy to customize a cover sheet without reaching for the Anacin. Its graphics tools are extensive enough to let you create cover sheets from scratch. For example, you can use your own logo; create lines, borders, and boxes; and use any font on your system. WinFax Pro also supports object linking and embedding, so you can create a cover page in another application—CorelDraw, say—and link it to WinFax Pro.

Even more powerful than its design tools is WinFax Pro's ability to use variables—like the recipient's name, fax number, and billing code—when creating cover sheets. Choose the recipient's name from a menu, and WinFax Pro inserts an *@r* variable, which it automatically replaces with the recipient's name when you send the fax. Variables also let you merge address lists with a letter template for the fax equivalent of mail merge. Datafax, Eclipse Fax, FaxWorks Pro, QuickLink, and UltraFax also offer basic fax-merge capabilities, but they don't support as many variables as WinFax Pro.

UltraFax comes in just a notch behind WinFax Pro—it supports variables, although not as many. Its graphics tools, however, are as solid and extensive as those in WinFax Pro.

The other six fax programs let you customize cover sheets to lesser degrees. DataFax, for example, lets you create cover pages, but its capabilities—especially its graphics tools—are rudimentary.

Best Choice for Complex Faxing: Delrina WinFax Pro

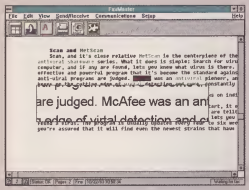


With solid annotation features, great cover-sheet tools, and fax-merge capabilities, WinFax Pro is—again—the only choice for the demanding faxer.

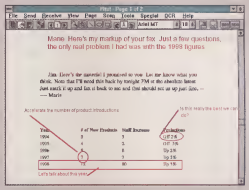
WinFax Pro • $129 • Delrina • 895 Don Mills Rd., 500 Two Park Centre, Toronto, Canada M3C 4W3 • (800) 268-6082
Circle Reader Service No. 748

Send a Fax, Save a Tree

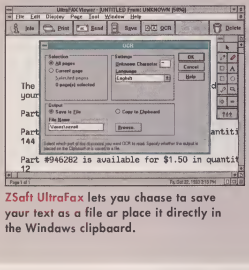
OCR, annotation, and fax merge cut down the paper trail.



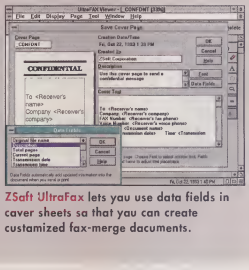
Caere FaxMaster shines when it cames ta OCR integratian, staring the original fax and the editable text tagether.



Eclipse Fax sets the annatatian standard, letting yau draw circles, baxes, and freehand figures and ratate type.



ZSaft UltraFax lets yau chaase ta save yaur text as a file ar place it directly in the Windows clipbaard.



ZSaft UltraFax lets you use data fields in caver sheets sa that yau can create custamized fax-merge dacuments.

Eclipse Fax can't import as many file types as WinFax Pro can, and creating and managing cover sheets is also substantially more difficult.

OPTICAL CHARACTER RECOGNITION When is a fax not a fax? When you hit the OCR button and convert a page full of pixels into editable text. Because the quality of the image you typically receive from a fax machine is so poor, OCR engines often have trouble interpreting the information. You need clean images, preferably those sent from another fax modem, in order for OCR to work well.

It's certainly not surprising that FaxMaster has the best OCR implementation—after all, Caere's name is practically synonymous with OCR. FaxMaster stores the original fax and the OCR text of the fax together to allow for quick comparison. If you've performed OCR on a fax and you come across what appears to be an error, double-click on the offending word to display that portion of the original fax, and you can compare your original with the OCR version. Using a text editor that's part of the program, you can then easily correct the OCR version.

All of the other programs support OCR, but none comes close to the integration that FaxMaster offers.

There's just one choice: Insist upon a printer with genuine Adobe™ PostScript™ software inside. It's the industry standard—the only way to guarantee that your printer will work with virtually every software application and hardware environment today and tomorrow. With Adobe PostScript, you're assured the highest quality output whether you're printing from DOS, Windows™, OS/2®, Macintosh® or UNIX®, from a PC or a mainframe. And since almost every major printer manufacturer offers

THE MOST IMPORTANT CHOICE YOU'LL MAKE WHEN CHOOSING A PRINTER, ISN'T JUST THE PRINTER.

Adobe PostScript printers, it's easy to choose the brand of printer that's right for your company. Remember, the best choice is the clear choice. Make sure your next printer has genuine Adobe PostScript. Accept no substitutes. For a free guide on how to choose a printer, call 1-800-962-3623, Dept. K, Ext. 6806.

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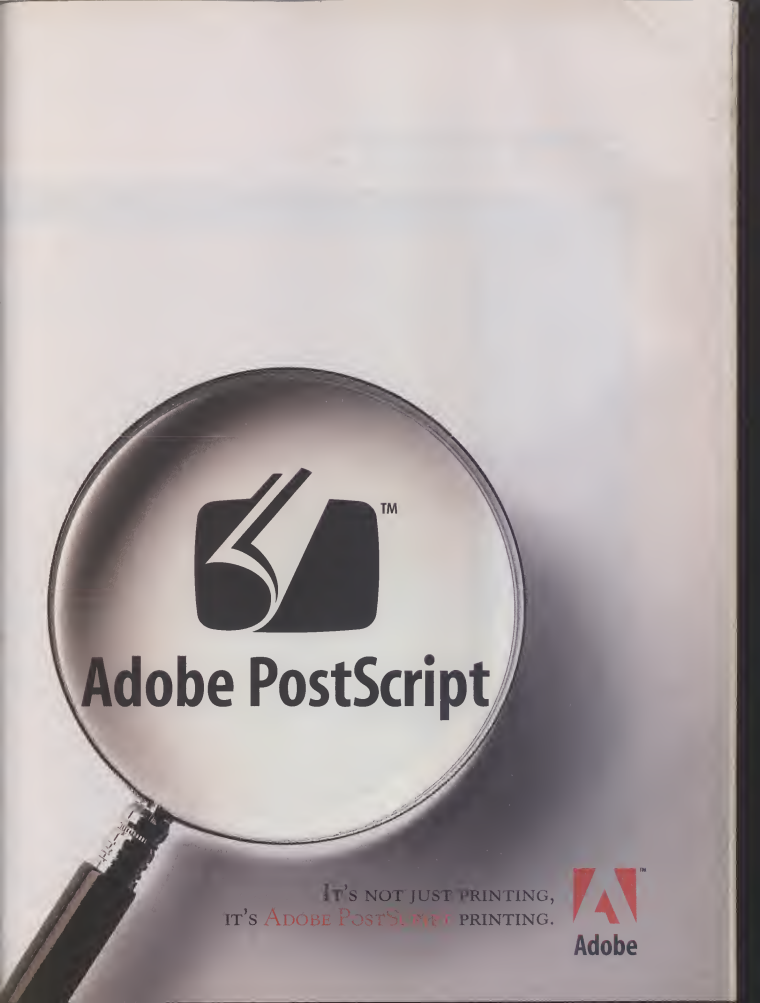
Circle 168 on reader service card.


TM
Adobe PostScript
IT'S NOT JUST PRINTING,
IT'S ADOBE POSTSCRIPT PRINTING.
Adobe

Fax Software Features at a Glance

WinFax and FaxWorks come equipped with all-Pro features.

	Caere FaxMaster	Delrina WinFax Pro	Eclipse Fax	Intel Faxability Plus/OCR	Smith Micro QuickLink Gold
Phone	(800) 535-7226	(800) 268-6082	(800) 452-0120	(800) 548-4725	(800) 964-7674
Reader service no.	747	748	749	750	751
Price	$109	$129	$129	$129	$100
SENDING					
Predefined cover sheets	0	101	6	4	0
Thumbnail view of cover sheets	○	●	●	○	○
Multidocument faxes	●	●	●	●	○
Fax merge	○	●	●	○	●
Copying images to fax page	○	●	●	○	○
TWAIN scanner support	○	●	○	●	○
RECEIVING					
Automatic fax forwarding	●	○	●	○	○
Received-fax compression	●	●	●	○	○
Fax cleanup	○	●	●	○	○
Multiple-page view	○	●	●	○	○
Annotation	○	●	●	○	○
Fax indexing	○	●	●	○	○
MANAGEMENT					
Multiple phone-book directories	○	●	●	●	○
Library for graphics	●	○	●	●	○
SUMMARY					
Pros	OCR integrated into program, easy to send quick faxes.	Powerful, easy-to-use viewers, fax merge, and fax logs.	Solid annotation tools, graphics library ability.	Simple tasks are easy to accomplish.	Bundles data and fax communications.
Cons	Lacks both annotation and sophisticated fax logs.	Lacks the ability to rotate type in annotation.	Complex interface.	Lacks annotation tools; logs and phone books lack finesse.	Low-powered, no annotation, difficult to use.
Verdict	If OCR is important, this is the package for you.	The best fax package there is.	Good for annotation, awkward interface.	Simpleminded program that needs a lot more features.	Use this fax software only if it comes with your modem.

Best Fax Software

Usability Notes

In search of the perfect fax package.

SofNet FaxWorks Pro	Tria DataFax	ZSoft UltraFax
(800) 429-9675	(919) 846-4990	(800) 227-5609
752	753	754
$130	$129	$49
10	1	12
●	●	●
●	●	●
●	●	●
●	●	●
●	●	○
●	●	○
●	●	●
●	○	●
●	●	●
●	●	●
●	●	●
●	●	●
●	●	●
Great fax logs, management, and diagnostics.	Faxes portions of a Windows screen, great phone book.	Fax-merge capability, good tools for annotation.
Locks annotation, not as easy as WinFax Pro	Very basic annotation, poor cover-sheet creation.	Navigating program can be confusing.
Great product for sending multifile faxes.	Can fax parts of a screen but difficult to use.	Feature set is extensive, program could be easier to use.

● YES ○ NO

What's the usability standard for fax software? Simple. It should be as easy to use as the trusty old fax machine and a hundred times as powerful. With a fax machine, you feed the original into the scanner, dial a phone number, push Send, and walk away. Fax software shouldn't be any more complicated than that. But with two notable exceptions, the current crop of fax packages falls short of this simple standard.

That's the inescapable conclusion we reached after putting the considerable testing muscle of the *PC/Computing* Usability Lab to work. A group of businesspeople sat down in front of PCs equipped with Intel SatisFaxtion modems and worked through a series of everyday fax activities. They created a custom cover page, added a short message, and sent the resulting page as a quick fax. They added, deleted, and edited phone-book entries and sent faxes directly from Word for Windows and Excel. They assembled a fax from a word processing document and a spreadsheet and sent the combination in a single transmission. They rerouted incoming faxes directly to a printer, outputting them in the background while using Word for Windows in the foreground. They saved incoming files as disk files in the background, again while using Word for Windows in the foreground. Finally, they scheduled fax transmissions to be sent at a specified time.

After completing the script, each tester filled out a form that asked how easy or difficult each of the tasks was to complete. In addition, they gave an overall rating for ease of use. Applying weightings to the various tasks and compiling the data, we calculated usability scores for each product.

Only two products—WinFax Pro and FaxMaster—earned our Usability Seal of Approval. WinFax Pro's button bars, easy-to-use fax logs and phone books, and simple approach to sending multidocument faxes earned it high marks in many tasks. FaxMaster was rated tops at sending quick, single-page faxes.

The other packages fell short in usability testing for several reasons. Testers consistently had trouble putting together cover pages. They found that just figuring out how to create a cover sheet was a hurdle—the feature was often buried several levels into a menu. And testers frequently complained that there weren't enough ready-made cover sheets to form the basis of new ones. Online help and documentation

were crucial for completing this task, but these key elements were substandard in the lower-rated packages.

Sending a multidocument fax was another usability mine field. Faxability Plus/OCR, Eclipse Fax, QuickLink Gold, and DataFax all came up short in this test. Each file must be converted before it's sent—a tedious process—and testers found that the software failed to make this process any easier. In addition, once the files were converted, it was difficult to gather them all in one place for sending. In some cases, our testers were unable to complete the task.

Eclipse Fax, QuickLink Gold, DataFax, and FaxWorks Pro were just plain hard to use, as their low usability scores show. Testers said that Eclipse Fax and QuickLink Gold should import a wider range of graphics files. They deemed the small icons in Eclipse Fax's toolbar unreadable. And sending multiple documents in one fax transmission proved so difficult in QuickLink Gold that several of our testers simply couldn't complete the task.

Testers deemed UltraFax's interface illogical and complained that the program, along with Faxability Plus/OCR, didn't give enough transmission feedback. They faulted FaxWorks Pro for an inflexible phone book, unintuitive icons, and poorly organized menus and icons.

Overall, testers found DataFax the least usable and gave it low scores for almost every feature. They complained of poor documentation, problems with sending faxes, awkward navigation tools, a confusing toolbar, and difficulties in creating cover sheets.

THE SETUP STORY

Installing fax software is ten times tougher than it should be.

Communications software must be nature's way of punishing you for not getting an engineering degree. Why do you have to enter port addresses, baud rates, and other technical trivia? Can't the software figure out these things itself?

Sadly, most packages can't—at least not yet. Fax software adds another layer of hassle to the installation process: You typically have to tell the software what type of fax modem you're using—Class 1, Class 2, or CAS (Communications Application Specification).

FaxWorks Pro is the friendliest of the packages we looked at; it includes a diagnostic utility that determines the type of fax modem you have, configures it properly, and even verifies that your phone line works. All the packages we reviewed make changes to your WIN.INI file and add files to your Windows or System directories, but only a handful have the good manners to ask you before doing so.

CAERE FAXMASTER

Required disk space: 8MB
Minimal installation instructions; system defaults may not always be correct; if you don't opt to register during the installation routine, you may inadvertently send your registration information along with your first fax.

DELRINA WINFAX PRO

Required disk space: 8MB
Solid, comprehensive installation instructions; automatically checks the COM port and modem class—you just verify the options; it asks your permission before modifying WIN.INI.

ECLIPSE FAX

Required disk space: 6MB
Good installation documentation; you tell the program what type of modem you have, and then installation is automatic; installation gauge keeps you informed of progress; alerts you that it has added files to your Windows directories.

INTEL FAXABILITY PLUS/OCR

Required disk space: 7.8MB
Straightforward installation, documentation provides information on changes made to WIN.INI file, easily accessible tech-support number.

SMITH MICRO QUICKLINK GOLD

Required disk space: 2.8MB
Minimal installation information in documentation; detailed notes on all changes to WIN.INI and files added to Windows and System directories; automatically detects modem and COM port, but sets the default to 2,400 bits per second anyway.

SOFNET FAXWORKS PRO

Required disk space: 4.4MB
Solid installation documentation, great gauge. A fantastic utility that tests whether your modem is responding and whether it's attached to a working phone line; reports modem type, manufacturer, and speed; and reports whether modem is attached to a working phone line.

TRIO DATAFAX

Required disk space: 10.4MB
Documentation notes changes made to WIN.INI file; gives you option of not modifying WIN.INI but doesn't explain how to modify it yourself; only package with an uninstall option; configures itself automatically to your modem, but not during installation (it does this the first time you run the program).

ZSOFT ULTRAFAX

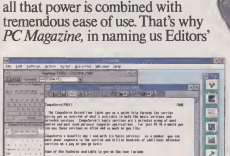
Required disk space: 5.6MB
Overall smooth installation, asks whether files should be loaded into Windows directory or an UltraFax directory.

The Leader Of The Pack In Windows Comm Software.

Naturally, you'd expect *us* to say that Crosstalk® for Windows is the biggest, baddest comm software around. But the experts agree with us: For both ease-of-use and power, Crosstalk blows past the other Windows™ comm programs–including Procomm Plus® for Windows.

Easy-To-Use Rider.

Crosstalk has always been known for its horsepower. But now all that power is combined with tremendous ease of use. That's why *PC Magazine,* in naming us Editors'



"Even with all the added interface pizzazz, Crosstalk keeps an air of clean, no-nonsense functionality, unlike Procomm for Windows, which offers enough glitz to be distracting."
—*PC World,* October 1992

Choice for the second year in a row, said, "This package has changed a great deal since last year, when it earned our Editors' Choice Award. But it has changed only for the better."

Crosstalk Leaves The Competition In The Dust.

Fact is, if you're ready for a Windows comm program, there are two products you're most likely to consider: Crosstalk for Windows and Procomm Plus for Windows. And reviewers have been clear

Crosstalk covers all bases with its sophisticated scripting for high-end users and quick on-line access for novices. This rich package is suitable for any environment....
—*PC Magazine* Editors' Choice, April 1993

about their preference.

PC Magazine called our interface "elegantly designed" while noting that with Procomm Plus for Windows, "so many non-essential elements remain on-screen during terminal sessions." And *Windows Sources* commented that Crosstalk, "unlike Procomm for Windows, provides a full screen for sessions." *InfoWorld* summed it all up: "Crosstalk is stronger than Procomm for Windows." Nuff said.

Ride With The Leader.

Through November 30, 1993, registered users of Procomm Plus or any Crosstalk product (including earlier versions of Crosstalk for Windows) can upgrade to Crosstalk for Windows 2.0 for only $49, by calling our toll-free number.

Give it a try, and you'll fall for the leader of the pack. And yes, we *are* talkin' to you.

1-800-348-3221, ext. 48K*

CROSSTALK

Another Communications Solution From DCA®

Offer expires 11/30/93 and is available in U.S. and Canada only. Must show proof of ownership. Limit one per site. Allow 6-8 weeks for delivery. (404) 475-8380. ©1993 Digital Communications Associates, Inc. DCA and Crosstalk are registered trademarks of Digital Communications Associates, Inc. Windows is a trademark of Microsoft Corporation. All other trademarks are the property of their owners. InfoWorld quotation from issue of May 17, 1993.

Circle 176 on reader service card.

FAX-MODEM ROAD MAP

Don't get lost in the communications wilderness. Choose a fax modem that's fast and compatible.

Time is money. You don't need an MBA to figure out that cutting your average fax time in half will slice a substantial chunk out of your annual telephone bill. So much for money.

Now let's talk about time. Your fax modem had better be compatible with your software, or you'll spend so much time trying to make it work that you won't have any time left to earn a living. And it had better be powerful, too, because you don't want the rest of your work to grind to a halt just because you're sending a fax.

Unfortunately, not all fax modems are created equal. Besides essential compatibility and performance differences, you need to consider convenience features—such as LCD displays that report fax-transmission status, and ports that let you connect a hand scanner for adding images to fax files.

To help you sort through the choices, we looked at 19 modems, all rated to fax at 14,400 bits per second. We tested the fax and data transmission speeds of every modem to narrow the field to 7. Each finalist then ran through a performance and compatibility gauntlet using all eight software packages we review in "Fax at Your Fingertips" on page 232. High-speed fax communication is no bed of roses, but we uncovered a solution to common fax problems (see "Fax Modem Failures: Notes from the Lab" on page 255).

What's at the top of your communications wish list? Performance? Features? Value? We found one modem that delivers on all three counts. But if you've already chosen your fax software and compatibility is tops on your list, take a look at "The Money-Saving Edge" on page 264.

And Then There Were Seven . . .

FINALISTS

- Boca Research 14.4 Kbps Modem With Fax
- Cardinal 14400 V.32bis
- Complete PC TurboModem Plus
- Intel SatisFaxtion Modem/400
- Practical Peripherals PM 14400FXSA
- Zoltrix 144/144
- Zoom FaxModem VFX V.32bis

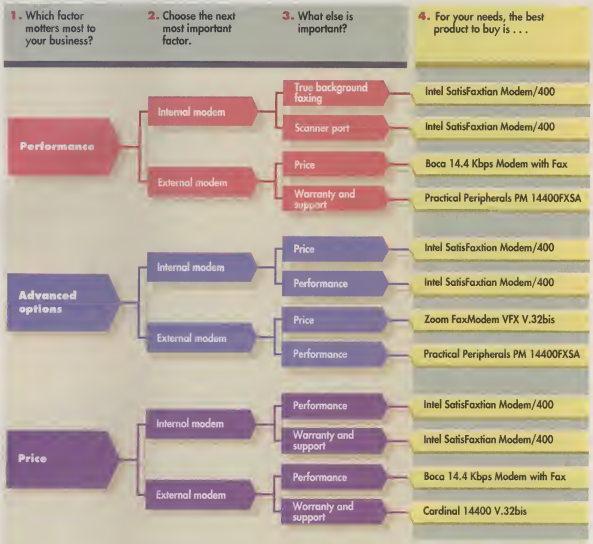
RUNNERS-UP

- Advanced Micracomputer XPress 144PC
- American Data Technology SmartFax 1414-SAU
- Best Data Smart One 1442FX
- Computer Peripherals ViVa 14.4K/Fax
- E-Tech PC1414MX
- GVC FM144/144V
- Hayes Optima 14400 Plus
- MultiTech 1432BL
- Omron Impala 14.4K Fax-Modem
- Supra FaxModem V.32bis
- U.S. Rabatics Caurier V.32bis Fax
- Zyxel USA U1496E Plus

Zoltrix

PC/COMPUTING DECISION MAKER

Choose the fax modem that's in sync with your business needs.



PC Computing BEST

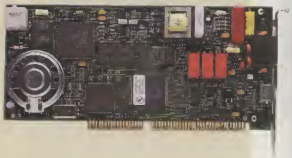
FAX MODEM

Intel's SatisFaxtion is fast and friendly.

The internal SotisFaxtion Modem/400 is o flot-out scorcher. In our tests, it cut the average time to send a fax by a minute, at that rote, it con pay for itself in weeks. Intel put o coprocessor and 512K of memory onboord—letting incoming and outgoing faxes stoy in the background, where they belong.

SatisFaxtion Modem/400 • $499 • Intel • 2200 Mission College Blvd., Santa Clara, CA 95052 • (800) 548-4725, (408) 765-8080

Circle No. 765 on Reader Service Card



Full Speed Ahead

The faster you fax, the more time and money you save.

A fax modem is a fax modem, right? Wrong. Performance of 14,400-bit-per-second fax modems varies for several reasons. First, even if two modems share the same basic chip, their fax standards can be executed differently, since manufacturers implement the Class 1 and Class 2 fax standards themselves or buy them from another manufacturer. (For more on standards, see "Fax Standards Demystified" on page 261.) Second, some fax modems use an encoding scheme when transmitting faxes. For instance, after sending a line of data, some will in the next two to five lines send only information about data that has changed since that first line was sent, in essence compressing the information. Modems using an efficient encoding scheme send faxes faster than those that use an inefficient encoding scheme or none at all. Other factors affecting speed are onboard coprocessors, which handle the faxing chores so your PC's processor doesn't have to, and onboard memory, used as a buffer to minimize data loss and allow faxes to be sent and received in the background.

TESTING TRIALS

Of the 19 modems ZD Labs tested, 5 failed to finish the first round of fax testing: the American Data Technology SmartFax 1414-SAU, E-Tech PC1414MX, Hayes Optima 14400 Plus, MultiTech 1432BL, and Omron Impala 14.4K Fax-Modem. In addition, the Advanced Microcomputer XPress 144PC fell out of the running when it flunked the data tests.

Some of the modems that didn't make the final seven had high fax-transmission speeds, but their data-transmission speeds were so low that they didn't make the cut, even with data speeds weighted at only 25 percent of the final performance figure. The Best Data Smart One 1442FX, for example, was the third fastest at sending faxes in our initial round of tests, but it was done in by poor data performance.

The clear winner in our performance tests was Intel's SatisFaxtion Modem/400. Quite simply, it's the fastest fax modem you can buy—by a wide margin. It sent faxes an average of 65 percent faster than the runner-up, the Boca Research 14.4 Kbps Modem with Fax. It owes its top-notch performance to its onboard 80C186 fax coprocessor, its 512K of onboard memory, and the efficient way the CAS protocol handles faxing. (See "Timing Transmissions" at right for a detailed breakout of text and graphics transmission speeds.)

The SatisFaxtion's average sending time for a two-page letter and a one-page graphic was 2 minutes and 28 seconds. No other fax modem broke the three-minute barrier. The Boca, the next-fastest performer, clocked in at a far slower 3 minutes and 46 seconds. The Practical Peripherals PM 14400FXSA was a close third at 3 minutes and 48 seconds, and on its heels was the Zoom FaxModem VFX V.32bis at 3 minutes and 53 seconds, followed by the Cardinal 14400 V.32bis at 3 minutes and 59 seconds. Bringing up the slow end were the Zoltrix 144/144 at 4 minutes and 3 seconds, and the Complete PC TurboModem Plus, which limped in at an average of 4 minutes and 28 seconds for the transmissions—a full 2 minutes slower than the speedy SatisFaxtion.

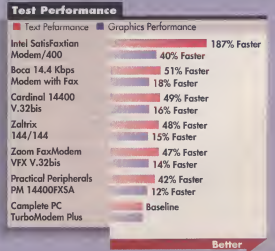
A COMPATIBILITY CAUTION

The internal SatisFaxtion is a proven performer, but don't buy it in combination with software that doesn't support the CAS standard (Smith Micro's QuickLink Gold, for example). This compatibility isn't a problem with the external version of the SatisFaxtion, however, since it can be used as a Class 1 or a CAS fax modem; unfortunately, the external modem doesn't have a coprocessor or memory onboard, so it's not likely to be as fast as the internal model.

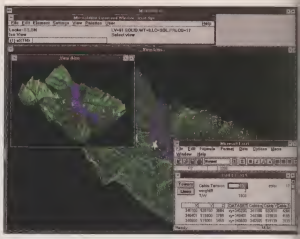
TIMING TRANSMISSIONS

Intel's SatisFaxtion tops the performance chart.

If your transmissions are text-intensive, Intel's SatisFaxtion saves you the most money. For graphics, Intel is still the answer, though the speed differences aren't as extreme.

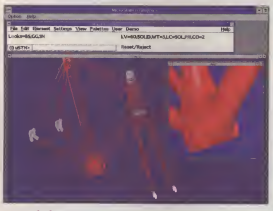


Rendering. *Visualization and flythroughs – at your fingertips! MicroStation offers photo-realistic rendering to every designer, right in the software. It's easy to make your image reflect your imagination.*

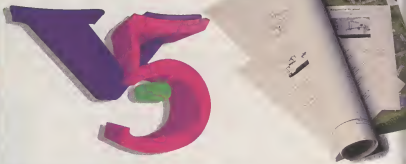


Windows. *It walks and talks Windows. Behind MicroStation lies the user-responsive programming you look for in good Windows software. Version 5 gives you the ultimate in integration of CAD, engineering, and business applications.*

MORE POWER TO YOU.

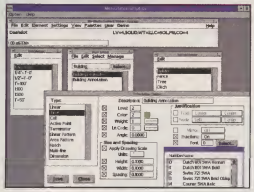


Modeling. *Model any surface you can imagine in MicroStation. NURBS surface modeling combined with 3D Boolean operations gives you astounding flexibility in creating and modifying freeform models.*



Drafting. *MicroStation gives you first-rate drafting powe – without the limitations of old technology. Enjoy the advantage of contemporary features like as ciative patterning/batching, plot preview, standard text editing an fonts, and context-sensitive Hypertext help.*

Read & write AutoCAD .dwg



Workspaces. *Choose the design environment that matches your profession or your CAD expertise – even AutoCAD. Complete with custom interfaces, drafting styles, and design environment management. CAD has never been so streamlined!*

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for futu

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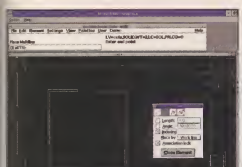

Usability. *What does computer-aided drafting have to do with the way you think? Everything. MicroStation software works for you. It understands the drafting process so well that it infers what you'll do next.*

Power. *Take your pick of popular environments: DOS, Mac, Windows, Windows NT, or UNIX. Have a look at MicroStation on Intergraph's Technical Desktop Series personal workstations.*

Graphical User Interface. MicroStation's easy-to-use interface includes pull-down menus, dialog boxes, tear-off tool palettes, and tool settings window. Choose your interface – Windows or Motif – on any platform. *Transparent Modeless Operation.* The software supports the way you naturally work, maintaining command execution while you fine tune: change element attributes or command parameters, manipulate views, change the dimensioning system, and more. *Powerful View Manipulation.* MicroStation supports up to eight active views that can be moved, sized, and overlapped to fit your design. Zoom and area at any scale. Move around your design fast with built-in dynamic panning. *Workspace Editor.* Tailor pull-down menus, dialog boxes, and tool palettes – even disable commands – with a graphically oriented toolset for customizing your chosen interface. *Text Capabilities.* A convenient text editor lets you easily edit single-line or paragraph text. Choose from TrueType, PostScript, AutoCAD SHX, and MicroStation fonts. ASCII text files can be imported and exported. *Multiple Undo/Redo Commands.* Undo mistakes and perform "what-if" designs in a flash with unlimited undo and redo. *Plotting.* Plot raster and vector information by view or defined areas, at any scale. Visually preview the plot before plotting, saving time and materials. *Online HELP.* MicroStation's HELP remains active, tracking the command you're currently using, so there's no searching through manuals for assistance. *Associative Patterning and Hatching.* Associate patterning with graphics. Change graphics and the patterning updates. Flood-fill hatching/patterning intelligently fills an area, detecting boundaries and holes with a single pick. *Associative Dimensioning.* Dimensions are associated with the geometry, not with a point in space, so that when you change the geometry, the dimensions automatically update. *Custom Line Styles.* Create space-saving custom line styles and place railroad tracks, trees, isobars – anything – just as you would place a line. *ulti-lines.* Define line string elements comprising up to 16 parallel lines of varying symbology and store them in a style library for . Architects can use multi-lines for fast and easy placement and intersection cleanup of walls and partitions. *2D Boolean ns.* Quickly modify, measure, and hatch multiple 2D shapes with integrated Boolean operations. *Mass Properties.* Calculate area and s of your model: surface area, volume, mass, centroid, moments and products of inertia, principal moments and directions, and radii of gyration. . Define relationships among graphic entities with intuitive drawing modes such as tangent, parallel, perpendicular, midpoint, intersection, and end- *asion-driven Symbols.* Based on established relationships, you can assign variables to dimensioned graphics and save the graphics as cells c placement. Changes in dimensions automatically drive changes to graphics. Dimension-driven design saves valuable time in the design of families of

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Circle 127 on reader service card.

What Makes a Fax Modem Great?

Memory and an onboard processor help you shift into overdrive.

When it comes to fax modems, you have a choice: internal or external. Go with an internal fax modem if you're economizing on desk space and want to conserve serial ports. Though internal modems have few distinguishing features, look for one with memory and a coprocessor for top performance; a port for a scanner is also a bonus. Another factor common to all internal modems is the universal asynchronous receiver/transmitter (UART), chip which converts analog data to digital form and back again. For 14,400-bps transmission, make sure that the modem has a 16550 UART, which includes a 16-byte buffer against data loss at high transmission speeds (see "Fax Modem Failures: Notes from the Lab" at right for more information on high-speed-transmission glitches). Important in an external modem is a good set of LEDs for tracking the status of your communications. An LCD in addition is ideal; it gives you even more information about your session, spelled out in English.

FEATURING THE FINALISTS

Intel's SatisFaxtion Modem/400 was the only internal modem among our finalists. This first-place modem has components that no other top competitors have, including an 80C186 onboard coprocessor and 512K of onboard memory. The SatisFaxtion also sets itself apart from other internal fax modems by using its onboard memory as the UART buffer, guarding against data loss and allowing you to receive faxes in the background. And it's the only modem with an onboard hand-scanner port, which simplifies scanner setup and spares a slot.

The only drawback to the Intel modem is that it's

FEATURES OF DISTINCTION

Some fax modem features enhance usability; others are just for show.

	Advanced Microcomputer Xpress 144PC	ADT SmartFax 1414-SAU	Best Data Smart One 1442FX	Boca Research 14.4 Kbps Modem with Fax	Cardinal 14400 V.32bis	Complete PC TurboModem Plus
Price	$299	$279	$319	$379	$299	$249
Phone	(800) 972-3733	(818) 578-1339	(800) 632-2378	(407) 997-6227	(717) 293-3000	(800) 229-1753
Reader service no.	755	756	757	758	759	760
Controls						
Design						
Coprocessor	○	○	●	○	●	●
DSP	○	●	●	●	●	●
Pros	Low price.	Low price.	DSP chip and coprocessor.	Second-fastest fax and data transmission.	Low price; limited lifetime warranty.	Fastest data transmission; inexpensive.
Cons	Failed first-round fax test.	Failed first-round fax test.	Slow data transmission.	Lacks features such as LCD and extra LEDs.	Average fax and data speeds.	Extremely slow fax transmission.
Verdict	Don't buy it for communicating at 14,400 bps only.	Not a good modem for 14,400-bps fax communication.	Quick for faxing, slow for data.	A quick product at a down-to-earth price.	For penny pinchers who don't need high speeds.	High data speed, low fax speed, low price.

On front | Volume control | Voice/data switch | LCD display

FAX MODEM FAILURES: NOTES FROM THE LAB

Here's how to get around problems with 14,400-bps fax communication.

They may say high-speed an the autside, but these 14,400-bps fax modems were gosping for breath when we octually osked them ta run thot fast. We had difficulties sending faxes fram fax madem ta fax madem: Often the cannectian dropped ta 9,600 bps ar slawer, sametimes a cannectian at 14,400 bps wauld tronsmit garbled text, and sametimes we cauldn't make a cannectian at all. Yau'll probably find yourself communicating ot 9,600 bps more frequently until 14,400 bps becomes the standard transmissian speed.

The heart of the problem is the canflict between COMM.DRV, the seriol-port driver in Windows 3.1, ond your PC's universal asynchranaus receiver-transmitter chip, better known as a UART. Mast madern PCs incorparate an advonced UART called the 16550. The advantage of the 16550 is a 16-bit FIFO (first in, first aut) buffer that allaws dota ta be sent and received safely ot high speeds. Internol modems have these new UARTs built in.

COMM.DRV, which is supposed ta handle the dirty work of data and part I/O, can't keep up ot 14,400 bps, causing nancannectians, premature discannectians, ar scrambled images. Ta get araund the problem, same cammunications packages, including Delrina WinFax Pra and Intel Faxability Plus, replace COMM.DRV with their awn Windaws driver, which handles the FIFO data praperly.

If yaur fax softvore daesn't include its awn communicotions driver, there's still hape—although you may find problems when used with onather cammunicotians package. In yaur SYSTEM.INI file, place the line COMxFIFO=0 in the [386Enh] sectian, replacing x with the number of the cammunicotions part yau're using. This disables the affending sectian af code in COMM.DRV, alang with the FIFO buffer. Save SYSTEM.INI ond restart Windows, ond yau have o better chance of successfully faxing at high speeds. Becouse the buffer is disabled, high-speed background transmissian will suffer and yau may lase data intermittently. The anly sure way ta avaid problems is to fax at 9,600 bps.

Computer Peripherals ViVa 14.4K/Fax	E-Tech PC1414MX	GVC FM144/144V	Hayes Optima 14400 Plus	Intel SatisFaxtion Modem/400	MultiTech 1432BL	Omron Impala 14.4K Fax-Modem
$299	$400	$399	$549	$499	$899	$400
(800) 854-7600	(800) 328-5538	(800) 289-4821	(800) 964-2937	(800) 538-3373	(800) 328-9717	(800) 362-4411
761	762	763	764	765	766	767
●	●	●	○	●	●	●
○	●	●	○	●	●	●
Onboard coprocessor.	Onbaard capracessar and DSP.	High data speed, onboord DSP ond coprocessar.	Midrange price.	High dato speed, anbaard DSP and capracessar.	Onbaard caprocessar and DSP.	Onbaard caprocessor and DSP.
Lacks on onboord DSP.	Failed first-raund fax test.	Sluggish fax transmissian.	Foiled first-raund fax test; na DSP ar capracessar.	Internal modem, so lacks LEDs; requires a TSR.	Foiled first-raund fax test.	Foiled first-raund fox test.
An average performer for on average price.	Nat a reliable madem far 14,400-bps tronsmissian.	Shines ot data transmissian, but a poor choice far valume faxing.	High priced, and unreliable far 14,400-bps fax transmissian.	Scarching speed and a scanner port make this the best.	Unreliable for 14,400-bps fox transmissian.	This madem is a paor choice for cammunicoting at 14,400 bps.

● YES ○ NO

Best Fax Modem

Continued on page 256

internal: This means that there are no LED lights or LCD messages to show transmission progress. And if your session freezes, you may have to reboot your computer in order to reset the modem; with an external modem, by contrast, you'd just need to flick the modem's power switch.

Of the external modems that we tested, the Practical Peripherals is packed with the most features. This large modem has a full complement of the usual LEDs and also an LCD—conveniently backlit so that you can read it in dim light or darkness. The LCD flashes an astonishing array of information about your communications session, including the class of fax modem that you're connecting to, the initial connection speed, the current connection speed, the number of the page being sent or received, and even dialing status. Another nice touch is the conveniently located power button on the front of the modem. The only downside to the modem is its rather large size—10 by 5 by 3 inches.

THE BEST OF THE REST

The Zoom modem is distinctive for its quantity of LEDs—15. Additional lights flash when a fax transmission is taking place; when the modem is communicating at 14,400 bps; and when V.32 and V.42 error correction and flow control are taking place. While the LEDs are no substitute for the excellent LCD on the Practical Peripherals, they'll give you a great deal of information about your communications session once you learn to read them. The Zoom's drawback is its plastic, lightweight design—it doesn't feel like it could stand up to a great deal of abuse.

The Zoltrix modem stands out mainly for one reason: its diminutive size. It's about half the size of most of the others, measuring 5¾ by 5 by 1 inch, and it weighs considerably less than the other modems. It's even small enough to be portable, although it lacks a battery. It also includes a voice/data switch so that you can switch between voice and data transmission in the middle of a call.

FEATURES OF DISTINCTION

Continued from page 255

	Practical Peripherals PM 14400FXSA	Supra FaxModem V.32bis	US Robotics Courier V.32bis Fax	Zoltrix 144/144	Zoom FaxModem VFX V.32bis	Zyxel USA U1496E Plus
Price	$549	$379	$795	$200	$349	$649
Phone	(800) 442-4774	(800) 727-8417	(800) 342-5877	(510) 657-1188	(800) 631-3116	(800) 255-4101
Reader service no.	768	769	770	771	772	773
Controls	On front, LCD	On front, LCD	Volume control	Voice/data switch		Volume control
Design						
Coprocessor	○	●	○	○	○	●
DSP	○	●	●	●	●	●
Pros	Third-fastest at faxing, LCD display.	Low price, LCD display, small size.	Onboard DSP.	Low price, onboard DSP, small size.	Inexpensive, long warranty, set of 15 LEDs.	Onboard DSP and coprocessor.
Cons	Lacks onboard DSP and coprocessor.	Average transmission speeds.	One of the slowest transmissions.	Average fax and data speeds.	Plastic case might not stand up to abuse.	Expensive; low fax and data speeds.
Verdict	Packed with the most user-convenience features.	For a rock-bottom price, average data and fax speeds.	Not a good choice for high-volume faxing.	An inexpensive, middle-of-the-road modem.	A reasonable performer at a low price.	An expensive modem with humdrum performance.

On front | Volume control | Voice/data switch | LCD display | ● YES ○ NO

The Choice Is
No Longer
Black And White.

is one of the thinnest color notebooks on the market — 1.77 inches. Its footprint measures only 11.7 x 8.5 inches, and it weighs under 5.7 pounds.

486 Power

You don't have to sacrifice performance to have color, either. ColorBook models are based on SL Enhanced Intel486® CPUs. Both ColorBook models include a floppy drive, 4MB of RAM (upgradeable to 20MB), and a large, fast removable hard drive. These notebooks are powerful enough to become your only computer!

Integrated Track Ball And PCMCIA Slots

The ColorBook includes a built-in track ball, which is much easier to use than a mouse in most portable situations. You also get two PCMCIA Type II card slots so you can plug in dozens of available PCMCIA peripherals.

intel inside

Greener Pastures

The grass *is* greener on the ColorBook side of the fence! It's an extraordinary value even by Gateway's standards — and we wrote the book on value! We have a reputation for offering the best prices on high-quality products with exceptional service from friendly folks in the Midwest. That's why the choice of a computer supplier is black-and-white, even when you're buying a color notebook! Give us a call.

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Introducing The ColorBook!

For the same money, you can have a black-and-white 486 notebook. Or you can have a color 486 notebook. Which is it going to be? Hay, it's not too hard to spot the best deal: the ColorBook from Gateway 2000! The new ColorBook has everything you're looking for in a portable at a price you'd expect to pay for a monochrome system. That's a special breed!

Exploding The Myth

Why do you expect to pay so much more for a color portable? Because other manufacturers always charge a plump premium for color. They've been milking the market, brainwashing you into thinking high-quality color costs a lot more to manufacture. It doesn't! We're selling the ColorBook for our usual cost-plus-small-margin. Now other companies will have a hard time perpetuating the color portable price myth. (Competitors absolutely *hate* us! Isn't it great?)

Experts' Reaction

We gave several PC trade publication editors a sneak preview of the ColorBook. Here's what they said about it: "Way cool!" "Dead on." "You won't be able to make enough of these."

Dazzling Color Display

The editors were impressed by the bright, crisp color graphics from the latest-technology, dual-scan STN display. It's a 9.4-inch VGA LCD, backlit for use in any lighting conditions. The editors said the ColorBook has the best STN color display they had ever seen! When they learned one model was priced *less than $2,000*, they were convinced the ColorBook will cause a stampede in the industry.

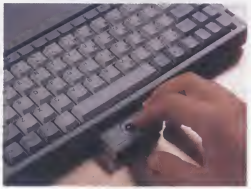
No Compromise On Size

Adding color to a portable usually means adding weight and bulk. Not so with the Gateway 2000 ColorBook. The ColorBook

Introducing The ColorBook!

The ColorBook is one of the thinnest color notebooks on the market — 1.77 inches. Its footprint measures only 11.7 x 8.5 inches, and it weighs under 5.7 pounds.

You'll appreciate the convenience of using PCMCIA cards. They're as easy to carry as credit cards, and they plug right into your ColorBook.



The integrated track ball slides out from a compartment by the space bar on the keyboard. You simply pull it out and go to work. Finished? Just slide the track ball back into the ColorBook.

FEATURES

Size

With the ColorBook, you get great color at a great price while maintaining excellent portability.

SL Enhanced Intel 486® Processor

ColorBook notebooks are based on Intel's new SL technology 486 microprocessors, which makes them powerful enough to serve as your desktop PC with an external mouse, keyboard and monitor. Supports simultaneous video on an external monitor at 640 x 480 resolution.

Dual-Scan STN Color Display

Dual-scan STN color is the latest technology in portable color displays, and it looks fabulous! You get 256 colors with the ColorBook running in VGA mode.

PCMCIA Type II Slots

Add a modem, network card or any of dozens of available PCMCIA-compatible peripherals. The ColorBook's two Type II slots can also be used for one Type III PCMCIA card.

COLORBOOK

- Weight: Under 5.7 Lbs.
- Dimensions: 11.7" x 8.5" x 1.77"
- SL Enhanced Intel 486 Processor
- 4MB RAM (expandable to 20MB)
- 3.5" 1.44MB Diskette Drive
- Removable Hard Drive
- 9.4" Backlit VGA Dual-Scan STN Color Display
- NiMH Battery & AC Pack
- Suspend/Resume Feature
- 2 PCMCIA Type II Slots
- Integrated Track Ball (2 Buttons)
- 85-Key Keyboard
- Parallel, Serial & PS/2 Mouse Ports
- External CRT Port
- MS-DOS® 6 and Windows™ 3.1

486SX-25

- 25MHz SL Enhanced Intel 486SX Processor
- 80MB IDE Hard Drive

$1995

486SX-33

- 33MHz SL Enhanced Intel 486SX Processor
- 170MB IDE Hard Drive

$2395

486DX-33

- 33MHz SL Enhanced Intel 486DX Processor
- 170MB IDE Hard Drive

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- Carrying Case
- Extra NiMH Battery

With PCMCIA 96/24 Fax/Modem

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With PCMCIA TelePath™ Fax/Modem

$449

COMBO PACK

- 124-Key AnyKey Keyboard
- MS Mouse
- 15" Color CrystalScan 1572FS

$499

Options include: PCMCIA fax/modem cards, PCMCIA network cards, 4MB or 16MB RAM upgrades, carrying case and extra NiMH batteries. Call for details.

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Prices and configurations are subject to change without notice. Prices do not include shipping.

Price Plays

You'll pay a premium for the fastest modems and the best features.

In general, the faster the modem and the more packed it is with features, the more it costs. It's no coincidence that one of the least expensive modems, the Complete PC TurboModem Plus, was also the slowest fax transmitter of our finalists, or that the much more expensive Intel SatisFaxtion Modem/400, was the fastest.

PRICEY PERFORMERS

For the performance-minded, the best value is without question the SatisFaxtion modem. Its $499 price is at the high end, but you get the top performer, plenty of features, and a built-in scanner port to boot. The SatisFaxtion comes with Crosstalk for Windows communications software and Intel's Faxability Plus Windows software—the same package we tested in our software reviews, but without the OCR capability and three-year warranty.

If money is no object and you want an external modem with top performance and the richest feature set, go with the Practical Peripherals. At $549, this unit is among the most expensive of the finalists. It virtually tied with the Zoom modem (which lists for $349 and comes with WordPerfect Communications with ExpressFax, and WinFax Lite for Windows) in our performance tests. The Practical Peripherals was sluggish, however, in our data transmission tests—coming in 10th out of the pack of 19. But when it comes to features, the Practical Peripherals is far superior. It's the only fax modem to include an exquisitely detailed LCD that gives you just about anything you could want to know about your communications session, from the current connection speed to the number of the page being sent or received. The Practical Peripherals also carries a full lifetime warranty and seven-day-a-week phone support—this is the best combination of support and warranty for any of the fax modems that we tested. It comes bundled with QuickLink communications and faxing software.

BEST FOR TIGHT BUDGETS

Cardinal's 14400 V.32bis and the Complete PC TurboModem Plus, priced at $299 and $249, respectively, have about identical features. The Cardinal has a slight speed edge over the Complete PC, and it also carries a lifetime warranty. The Complete PC has a seven-year warranty. Both modems have bundled software—the Cardinal's QuickLink II and the Complete PC's RapidFax Windows—but these packages aren't up to speed with Delrina WinFax Pro, ZSoft UltraFax, or Eclipse Fax.

Finally, if all you care about is saving a buck, the Zoltrix 144/144 is for you. With a list price of only $200, it carries a five-year warranty and comes bundled with both Bitfax and Bitcom. And the Zoltrix has the most compact design. But if time is money for you, this product is no bargain. It tied the Cardinal and beat only the Complete PC TurboModem Plus in combined fax and data times.

FAX STANDARDS DEMYSTIFIED

From CAS to class, here's what it all means.

Three hardware standards gavern the way saftware communicates with a fax madem:

CLASS 1 is essentially an extensian ta the Hayes AT cammand set. It cavers such elements as the cammands the saftware needs ta give the madem in arder far the madem ta make a phane call. Since it's an alder standard than Class 2, it tends ta be mare stable. Class 1 madems are mare likely ta wark with a wider range af fax saftware.

CLASS 2 lets the hardware da mare af the wark than Class 1, easing the burden an the fax saftware. Class 2 daes everything that Class 1 daes, and an tap af that determines haw the fax madem handles data campressian and errar carrectian, amangather things.

CAS (Cammunicatians Applicatian Specification) is a standard that Intel and DCA develaped jaintly. While it was ane af the first praposed fax standards, it has been largely ignared by everyane except Intel, whase SatisFaxtian Madem/400 uses it.

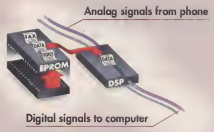
CAS is a higher-level interface than Class 1 and Class 2, it handles mare nitty-gritty details af fax transmissian, and it allaws far the transfer af binary files between CAS fax madems. Its chief benefit is that it was designed ta be used with a fax capracessar, so that the CAS madule and the capracessar can handle all the faxing wark in the background. The biggest problem with CAS is that it requires a TSR program ta be run under DOS.

CLASS 3 develapment has been the subject af same talk, but pragress has stalled, and same pessimists believe that it may never came ta fruitian. Class 3 was suppased ta mave even mare functianality ta the fax hardware fram the software and CPU. Considering that even the Class 1 and Class 2 standards are not true standards, Class 3 is still a while away.

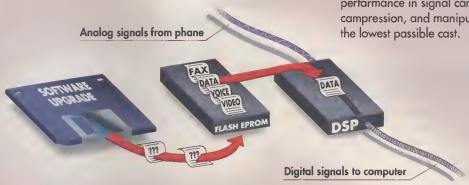
Voice on a Chip

Digital signal processing: now and then.

DSPs convert analog signals such as fax ar voice tones to digital signals, and vice versa. In the short run, their greatest use will be ta cambine fax, data, and vaice pracessing on a single chip. Eventually, they'll be used for pracessing full-matian video, camplex graphics, and color fax.



TODAY'S DSP CHIPS have campressian algorithms hard-wired in EPROM. This gives aptimal perfarmance in signal canversian, campression, and manipulation at the lowest passible cast.



TOMORROW'S DSP CHIPS are being developed to hold the campression algorithm—whether fax, data, vaice, or video—in flash EPROM. The benefit is that end users can upgrade flash EPROM through software alane.

COMING SOON: FASTER, SMARTER FAX MODEMS

Look for DSPs to add new tricks.

A madem running at 14,400 bps with fax and data capabilities may sound impressive, but the truth is, it's almost ald hat. The next generatian af modems, based an digital signal processors (DSPs), are already being shipped, and they're expected to supplant today's high-speed modems, possibly within the year.

DSP-based fax madems will add voice manipulation to the data, fax, and answering-machine capabilities af the current generation of fax modems based on Rockwell chip sets. And even if yau don't want vaice mail on a modem, the vaice capabilities will forward faxes, read Windows-based text and data files out loud, and suppart voice cover sheets for faxes. DSP-based fax madems alsa are expected to make it easier to raute incoming faxes an a network. And to add capabilities, you can just download a software upgrade.

Digicom Systems was ane af the first vendors to ship a DSP-based modem, the $199 Cannection 96 Plus. At press time, it didn't include vaice capabilities. IBM's $350 WindSurfer is among the first DSP-based modems with voice technology. It offers voice messaging as well as 19,200-bps data and 9,600-bps fax capabilities. National Semiconductor's $279 TyIn 2000 provides several vaice capabilities through its Windows software. It offers 9,600-bps fax but only 2,400-bps data transmission.

While DSPs hold great promise, there is no current standard for them, so each manufacturer has gone its own way in designing the chip sets. That paints ta campatibility problems and means that software makers may have ta customize products far each DSP-based madem.

They're both fast and powerful, but only one will never be obsolete.

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Anytime Ma Bell, the FCC, and a bunch of propeller-heads get together, things get mighty complicated, mighty quickly. And in the technocentric world of fax modems, standards and compatibility are slippery things. That's a good reason to get a money-back guarantee from the makers of your fax hardware and software. The safer course is to make sure both pieces have been tested together. That's why we asked ZD Labs to test our fax modem finalists with all eight software packages. The good news: Only three combinations failed outright. The better news: Our extensive matrix shows you the best money-saving combinations.

If you're looking for the best fax hardware and software combo, the choice is clear: Get the internal version of the Intel SatisFaxtion Modem/400 and Delrina WinFax Pro. The SatisFaxtion is the top-performing fax modem, and WinFax Pro the best of the fax software—you can't go wrong with this bundle.

The SatisFaxtion modem aced our performance tests, sending and receiving faxes faster than any competing modem, and with uniformly high-output quality.

WinFax Pro similarly dominated the software category: Our tests determined it to be both the most usable of all the fax software and the most full featured.

There's also a certain amount of synergy between the SatisFaxtion modem and WinFax Pro. The SatisFaxtion has a built-in scanner port into which the Logitech ScanMan 256 grayscale hand scanner can be plugged, easing installation problems and saving you a slot. The scanner adheres to the TWAIN standard, and so does WinFax Pro. That means that you can scan in a document and then fax it without leaving WinFax Pro.

The only drawback to this winning duo is that the SatisFaxtion requires a 65K TSR program because it's a CAS modem. Still, that's a small price to pay for a top performer.

THE MONEY-SAVING EDGE

Compatibility isn't enough: Watch your pocketbook, too.

Our matrix shows you which products worked together in our tests and how much money each combination saves you over the slowest pairing. Dollar figures equal theoretical savings, assuming 100 fax pages per month.

	Caere FaxMaster	Delrina WinFax Pro	Eclipse Fax	Intel Faxability Plus/OCR	Smith Micro QuickLink Gold	SoftNet FaxWorks Pro	Trio DataFax	ZSoft UltraFax
Boca Research 14.4 Kbps with Fax	$310	$700	$955	$470	$550	$950	$555	**$1,065**
Cardinal 14400 V.32 bis	$275	$685	$565	$495	$510	$950	$490	**$1,060**
Complete PC TurboModem Plus	$45	$270	$870	Fail	$530	$810	$500	$375
Intel SatisFaxtion Modem/400	**$1,125**	**$1,095**	**$1,115**	**$1,110**	Fail	**$1,115**	**$1,100**	**$1,115**
Practical Peripherals PM 14400FXSA	$550	$630	$910	$455	$555	$870	$560	**$1,030**
Zoltrix 144/144	Fail*	$675	$580	$480	$555	$930	$535	Fail
Zoom FaxModem VFX V.32bis	$0	$665	$935	$485	$560	$925	$535	**$1,085**

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PC/Computing, July 1993.

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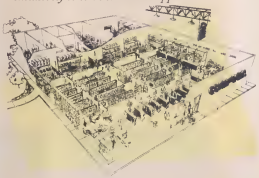

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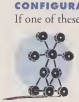

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No longer must you wade through 1,000-page programming manuals just to create a simple table. Gone are the days of clumsy command-driven data entry. If you can point a mouse and pull down a menu, you can create attractive and powerful databases.

PC/Computing teamed up with ZD Labs to evaluate four of the top Windows relational databases: Borland International's Paradox for Windows, Lotus Development's Approach for Windows 2.0, Microsoft's Access 1.1, and Software Publishing's Superbase 2.0. We deliberately didn't include Xbase products such as Microsoft's FoxPro because they are targeted more at the professional developer than at the business user.

After subjecting the products to rigorous usability and performance testing, we found all four to be powerful and easy to use. Access and Paradox in particular won accolades—and our admiration—sweeping every category we tested between the two of them.

Access led in user satisfaction by a hefty margin. Microsoft's Wizard technology, which walks you through the design of Access's forms and reports, made some of our most complex tests seem like child's play. Our usability testers fell in love with its comprehensive-but-never-intimidating help facilities, especially its Cue Cards—online help pages that lead you through a variety of common tasks such as creating a report. Access's manuals also were clear and well written, although you may never need to break their shrink-wrap.

BY PETER COFFEE

PHOTOGRAPHS BY RENÉ RIESENBERG

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Paradox rated No. 1 in productivity and ate our performance benchmarks for lunch. Our tests showed that you can get more done in less time with Paradox than with any other product—as long as you're willing to get into the Paradox way of working. Paradox's relational engine, InterBase, makes loading, indexing, and querying data rocket fast.

Superbase boasted high efficiency. Though not up to the mark set by Paradox, Superbase users were able to complete our usability tests quickly. We were particularly impressed by its macro recorder, but its many nonstandard dialog boxes make it confusing if you're more accustomed to most modern Windows applications.

Approach's Spartan design is both a pro and a con. With some refining, Approach will be great for users who never want to program. Unfortunately, we found it cumbersome and clumsy when performing many common tasks such as report and form design.

In a close competition, Access, with its Wizard and Cue Card technology, combines database power and usability. Paradox, the close runner-up, focuses on power and performance but has a steeper learning curve. What about Superbase and Approach? We'll wait and see what the next version of each brings.

HOW THEY COMPARE

Access and Paradox weigh in with great features.

	Borland Paradox for Windows	Lotus Approach for Windows 2.0	Microsoft Access 1.1	Software Publishing Superbase 2.0
File storage	Paradox stores its files in either its own format or the popular dBASE format.	Approach doesn't have its own file storage format but can read and write dBASE, Paradox, FoxPro, Oracle, and Sybase formats.	Access uses a proprietary format but can read and write a variety of spreadsheet and database file types including 1-2-3, dBASE, and Oracle.	Besides its own file format, Superbase reads and writes dBASE tables and indexes. It also imports and exports Paradox and 1-2-3 files.
Automation techniques	With no macro recorder at all, you're forced to write code in ObjectPAL, a powerful but opaque C-like language.	Approach has no programming language but has a capable, if limited, macro builder.	Microsoft uses a language called Access Basic that's easy to learn and use and can create macros that require no programming.	Superbase's exemplary macro recorder employs Super Basic, which is also its programming language.
Interface	Paradox uses Borland's distinctive Windows interface.	Approach uses a a Spartan, straightforward Windows interface.	Microsoft has adhered to the Windows interface standards it developed.	With remnants of its early Windows 2.0 interface intact, Superbase needs an interface lift.
External database access	Currently, Paradox can access only dBASE and Paradox files. Coming soon: access to InterBase, Oracle, and Sybase/Microsoft SQL Server databases.	Approach can deal with standard PC file formats, and Oracle, Sybase SQL Server, and even DB2 databases on the mainframe.	Access supports the Open Database Connectivity (ODBC) standard, which enables it to get into most major SQL databases.	Superbase can get to just about anything, with SQL connections to DB2, XDB, Gupta SQLBase, Sybase SQL Server, Oracle, Ingres, and TechGnosis.
Who is this product best for?	Paradox is best suited for professional developers and users who aren't afraid to sling code.	Approach is for end users all the way.	With a broad set of tools, Access is appropriate for casual users and developers alike.	Superbase has a loyal base of developers. It's also a good choice for anyone dealing with multimedia.
What's next?	Look for enhanced performance, new ObjectPAL commands, and links to more external databases.	Since Lotus bought Approach, you can expect a slew of changes, including Smart Icons.	The Access interface will begin to resemble the other products in Microsoft's Office suite.	Expect ODBC hooks and a new Visual Basic interface.

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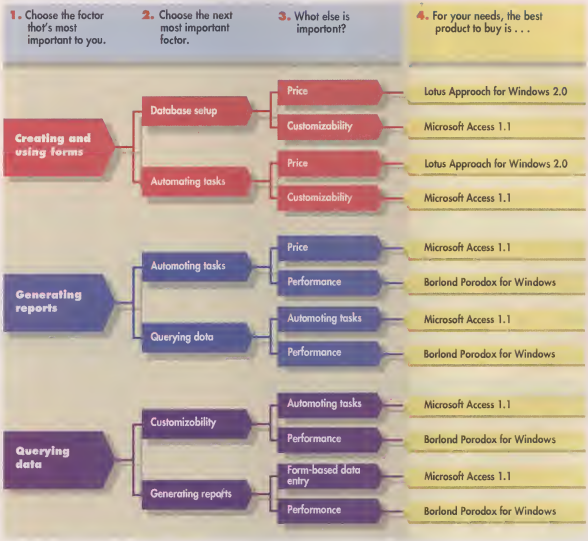

PC Computing BEST

MICROSOFT ACCESS 1.1

Easy to use and powerful.

Access holds your hand through anything you aren't sure of, but can still make applications like the pros. It finished a close second in our usability tests, which emphasize efficiency, and it led the pack in user satisfaction. With helpers like Cue Cards (step-by-step online instructions) and Wizards (which do complex tasks for you), anyone can look like a database pro without even cracking a manual.

Access 1.1 • $495 • Microsoft Corp. • 1 Microsoft Way, Redmond, WA 98052-6399 • (800) 426-9400, (206) 882-8080

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Create a Database

Building a database is the first thing you do with one of these products—shouldn't it be simple?

Want paint-by-numbers ease and Michelangelo results? Use Microsoft's Access 1.1. Although our testers found they could create databases faster with Paradox, they rated Access highest in user satisfaction. Approach and Superbase trailed the top two in our ratings, with Superbase a close third.

Here's how easy Access is: Click on one button, and you've already begun to create a table. Access then presents you with its table-definition dialog box, a spreadsheet-like window with fields for field name, data type, and description. As you enter field names, Access provides appropriate default settings. When it needs more information about a field, the program pops up a clever dialog box that prompts you for things like the size of the field, a default value, and the number of decimal places to display. If you need help, you'll love Access's Cue Cards—step-by-step help that always stays visible.

By contrast, Paradox makes you play guessing games to create a table. Its field-definition dialog box offers four blank spaces for each field—name, type, size, and key (for indexing)—without supplying default values for any of them. Worse, although Paradox lets you skip past field type or size, you'll get an error message telling you they're required when you try to save the table. In short, you need to adjust to the Paradox way of creating a table.

Superbase is confusing from the start and soon becomes completely inscrutable, thanks to oodles of nonstandard dialog boxes that are cluttered with options. Despite that, Superbase required the fewest trips to the Help menu of all four products.

Approach is initially confusing because of its odd nomenclature (it calls tables databases) and the way it stores files (you must choose a format to store them in when you create them). Our testers consistently stumbled over a usability glitch: If you hit the Enter key once too often while in the table-creation dialog box, you'll leave that box without warning.

Any of the four contenders can help you quickly create a powerful database. But Access offers the best combination of intelligent defaults and no-nonsense help, and Paradox gets you going in a jiffy.

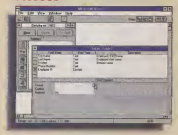
		Verdict
✓	**Microsoft Access 1.1**	**9.8**
	Borland Paradox for Windows	9.4
	Software Publishing Superbase 2.0	9.3
	Lotus Approach for Windows 2.0	8.5

FAST AND EASY

Access creates tables with unheard-of ease.

Our usability testing showed that you can create tables while half asleep with Access. That's because Access's FormWizards baby-step you through the table-creation process, prompting and prodding you at every turn. If you need help, try the Cue Cards.

Access



It's easier to comprehend than Paradox, but it forces you to move around the screen to create fields less efficiently.

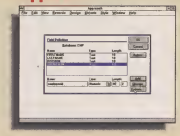
Superbase

Loaded with useful buttons, Superbase's table-creation tool lets you mix uppercase and lowercase letters but you can't use spaces.

Paradox

Our usability tests don't show you that Paradox's table-creation utility lets you skip required fields, and beeps at you when you save.

Approach



The default tables in Approach look clunky because they won't let you use spaces or lowercase letters in field names.

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Create and Use Forms

Forms let you dress up your database to make it more engaging, turning raw data into meaningful information.

It may take a bit longer to create and modify a form using Access, but no one seems to mind. Why? Microsoft's FormWizards. Last year, *PC/Computing* gave Microsoft an MVP Award for the Wizards concept, and we stand by it: They are a great addition to Access. Our usability tests back us up: Access had the highest satisfaction ratings in this category, followed by Paradox.

The graphical tools in Access's form-design environment follow all the usual conventions of Windows graphical products; we found it easy to modify form layouts, revise titles, and make other changes. Access isn't perfect, though: A table-based form can retrieve information only from one table. To display information from two tables, you need to create, design, and embed a subform in your main form. If you want to get information from three tables, you need to construct a query—and then you have to consult the manual to learn which fields can safely be updated.

In many but not all ways, it's even easier to create and modify forms in Paradox than it is in Access. For example, in Paradox a label and its data field are one object that you move around together (in Access, they're frequently separate, and you move them separately). Yet another advantage to designing forms in Paradox is that there's no restriction on the number of tables that you can display on a form—Borland abandoned the form/subform restriction when it introduced Paradox 4.0 for DOS.

Users found creating forms in Superbase overly complex—they felt as though they'd entered a program separate from the Superbase core environment. Approach is possibly the best database for easily creating forms. So why didn't it win? Users found it difficult to figure out how to save and retrieve a form; so although it was easier than the competition for one-time use, it was worse for repeated use. In some of our form-creation usability tests, Superbase tied with Approach.

Looking for a database that's easy to browse through and still powerful? Look no further than Access and Paradox. Approach and Superbase are too complex to rival these masters of clarity.

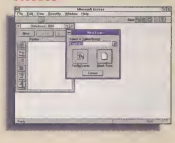
	Verdict
Microsoft Access 1.1	**8.9**
Borland Paradox for Windows	8.8
Software Publishing Superbase 2.0	8.7
Lotus Approach for Windows 2.0	6.6

THE SORCERY OF WIZARDS

Access's FormWizards make it magically easy to create forms.

Even if you've never used a database before, FormWizards will make form creation a simple matter of multiple choice. Prompting you every step of the way, Access won't let you go wrong. Even better, the results look thoroughly professional.

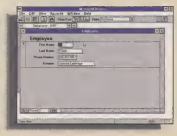
Access



Step 1
The first step in creating a form is to click on the New button. That brings up Access's first FormWizards screen.

Step 2
The FormWizard offers many choices, each showing you what your form will look like and examples of completed forms.

Step 3
Then all you have to do is to tell the FormWizard which fields you want shown on the form by clicking on a single button.



Step 4
That's all there is to it: The FormWizard knocks off a clean form faster than you can say "abracadabra."

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The Bottom Line

HandBook 486 models start at only $1,495, an extraordinary value even by Gateway's standards — and we wrote the book on value! We have a reputation for offering the best prices on high-quality products with exceptional service from friendly folks in the Midwest. Give us a call. Once you get your hands on a HandBook, you'll wonder how you ever lived without one!

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FEATURES

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Query Data

Databases shine when they're pulling order out of chaos. You want a tool that can handle complex relationships.

You shouldn't need thumbscrews to coax a few answers out of your database. The ideal database helps you build an intelligent query and get fast, accurate results. Our usability tests revealed that Paradox and Access excelled at data queries, with Paradox out in front.

Paradox's strength is a consolidated query-building interface. You choose the tables for the query, Paradox displays all the field names in those tables, and then you click on the fields you want the query to return. Simple. Our one complaint: Paradox spreads a table's fields across the screen—from side to side—rather than from top to bottom. This orientation makes it hard to see all the field names when dealing with a big table.

Access, on the other hand, puts all the tables in a query in one window, presenting fields in a vertical list and using lines between tables to show relationships. You can double-click on a line to display a list of join options. Access also provides a rich selection of query types, including select queries, which simply find data; update queries, which change data globally; and cross-tab queries, which slice data into useful cross sections.

Approach and Superbase shared an overall query-data usability score and they both have less-than-obvious methods for building queries. With Approach, our usability testers were perplexed that they had to save a query by turning it into a macro. They preferred the way that Paradox and Access handle queries, saving them as objects that exist alongside the tables on which they operate.

Similarly, the testers didn't like Superbase because they found building a query to be like peeling an onion: When you think you're done, you discover another dialog box to be dealt with. And its query-by-example interface is irritatingly inconsistent: To select a field for querying, you click on an icon at the top of the window instead of simply clicking on the field itself. The only way to find out what the icons in this window do is to start clicking—there's no online help.

Ask us no queries, we'll tell you no lies: Paradox won this category with its ease of use, followed by Access. Approach and Superbase disappointed us.

		Verdict
✓	**Borland Paradox for Windows**	**9.7**
	Microsoft Access 1.1	9.6
	Lotus Approach for Windows 2.0	7.4
	Software Publishing Superbase 2.0	7.4

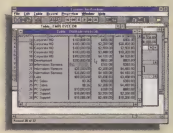
QUICK QUERIES WITH PARADOX

Choose your table, choose your field, and voilà.

Paradox lets you create even complex, multitable queries with ease. It presents all vital information in simple dialog boxes. It's too bad that getting Superbase to perform the same task is like getting a Yugo to drive above 60.

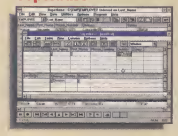
Paradox

Step 1
In Paradox, you just select the fields you want displayed and enter a simple formula to make your query do some work.



Step 2
Presto, the result pops up in a window worthy of your quarterly report—almost. And it takes almost no time to run.

Superbase



Step 1
Superbase starts out looking a lot like Paradox, with the check marks and side-to-side display of field names.

Step 2
But once you have to join a table, all similarity ends. You enter a formula to join the tables—if you can figure out how in the manual.

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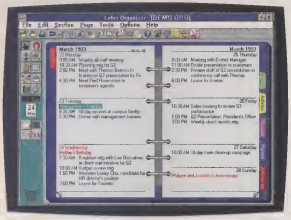

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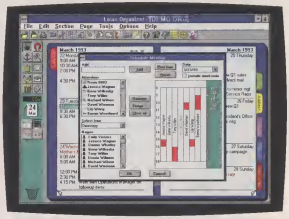
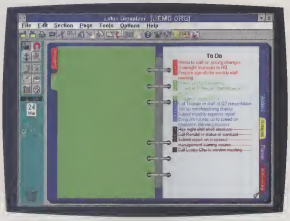
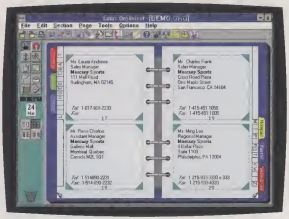


Lotus Organizer with group scheduling makes it fast and easy to set up a meeting among a large group of people – no matter where they're located.

So, what does your day look like?



The To-Do section lets you prioritize tasks as you enter them and view entries by due date.



Sort your address book in any of four formats: name, company, zip code and type of record. An Auto Dialer lets you simply drag and drop to dial a number through your modem.

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Automate Tasks

How do you streamline the day-to-day drudgery of using a database? You build a simple application.

Which database offers the best tools for automating tasks you perform regularly? For us, it's Microsoft's Access, which combines a powerful macro developer with a fair programming language.

Access's system for developing the building blocks of an ad hoc application is drag-and-drop simple. Want to create a program that opens a form? Call up the macro tool and drag the form you want into it. Zap! You now have a macro that opens a form. To attach this macro to a button on another form, just drag the macro's icon onto the form. All this without writing a word of code. To make the second form synchronize with the first, you'll need to write one measly line of code.

For the casual programmer or the professional, Superbase is a superb choice. This is the only database we reviewed that uses a macro recorder rather than a macro builder. And Software Publishing did the macro recorder right: You step through the actions you want to program, and Superbase translates them into fully documented Super Basic code.

Approach, which is hampered by its lack of a programming language, vies for last place with Paradox, which is hindered by its lack of a macro builder. Approach's macro builder is simple and powerful, although it's not strong enough to compensate for the lack of a programming language. You use check boxes and lists to select the actions you want the macro to perform, so creating a macro and even having one macro call up another is easy. Adding a button to a form, however, isn't quite so simple. You must switch back to form-design mode, add a button, then link the macro with it.

Paradox is the choice for professional developers. Its C-like programming language runs rings around the BASIC variants in Access and Superbase. It's completely object-oriented, which means you can quickly develop powerful applications—not just macros—and reuse parts of them easily. But the part-time programmer and the business user will quickly feel frustrated. Before you can automate anything, you'd better be prepared to sling code.

For getting a powerful application up and running in a jiffy, Access is hard to beat.

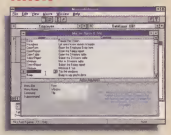
		Verdict
✓	**Microsoft Access 1.1**	**9.6**
	Software Publishing Superbase 2.0	9.0
	Lotus Approach for Windows 2.0	6.5
	Borland Poradox for Windows	4.5

TO CODE OR NOT TO CODE

That's definitely the question.

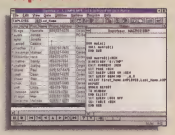
The products we tested ran the gamut, from "no programming allowed" to "sink or swim, buddy." We loved Access and Superbase because they gave us the choice of generating a quick macro or developing a full-fledged application.

Access



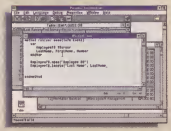
With Access, you select the action you wont. When the oction is selected, the bottom of the screen presents more options.

Superbase



You hove the best of both worlds in Superbose because its mocro tool records in Super Bosic, its programming languoge.

Paradox



On the other hond, Porodox mokes you progrom fiercely. ObjectPAL, its C-like longuoge, is o touch on the terse side for our toste.

Approach

Although it hos no programming longuoge, Approoch's powerful mocro creotion tool mimics Access's functions.

IMPROV 2.1. BECAU
DO NOT ALWAYS TH

There's more than one way to look at data. And chances are good that the Brand Manager's way will be different from the CFO's. And the Corporate Planner's will be different still. And so on.

If you and the people you work with are spending a lot of time rebuilding spreadsheets and reworking data, you should know the good news. It's called Lotus® Improv.* and it is unlike any spreadsheet you've ever seen.

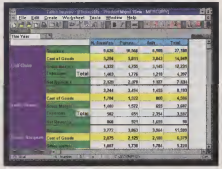
DYNAMIC VIEWS. NOT JUST A NEW FEATURE SET. IT'S A NEW MIND SET.

With its Dynamic Views, Improv lets you rotate, hide, show, collapse and expand worksheets in ways no traditional spreadsheet can. Rather than spending hours reconstructing worksheets to gain new perspectives, the new view is created on the spot.

A Regional Sales Manager with a major sporting goods manufacturer uses Improv to track sales activity. Dynamic Views lets her blend sales analysis with market trend data twelve months out and beyond. Improv's flexibility gives her the edge she needs for street-smart decision making.

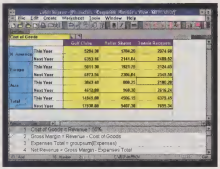
THE ONLY SPREADSHEET THAT SPEAKS YOUR LANGUAGE.

With Improv, you write your formulas in plain English, like "Gross Margin = Revenue – Cost of Goods." Besides being more natural than (A10 – B10), this has several big advantages. First, it's easy for anyone you work with to follow the spreadsheet's logic, even if they're looking at it for the first time.



Ever see everyone get what they need from one spreadsheet? Here's the corporate financial data arranged by product.

And the formulas are general, so they can be applied to many cells at once. No matter how much you shift or expand your data, the formulas remain unchanged — there's none of



Just drag and drop for a new view, by region. Dynamic Views makes the change instantly.

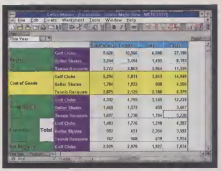
the cutting and pasting of traditional spreadsheets and none of the potential for error.

A Market Trends Analyst relies on Improv to lay out trends in demographics and sport

*Anyone who bought Improv Release 2.0 can get the network ready edition of Improv Release 2.1, WK4 support and the Application Field Exchange features free in an update kit. O+E Extend will not be available as part Improv for NeXT® CA Compete and Symphony® **In Canada call **1-800-GO-LOTUS** ©1993 Lotus Development Corporation, 55 Cambridge Parkway, Cambridge, MA 02142. All rights reserved. Lotus, 1-2-3, Lotus of Microsoft Corporation. Quattro is a registered

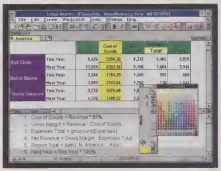
SE GREAT MINDS
INK EXACTLY ALIKE.

participation and give his people more confidence in their numbers. With Improv there are no cryptic formulas. Everything is spelled out in a way that makes sense. And there's no longer the fear of forgetting to update that one cell.



Drag and drop again for yet another view. You can save different views for future reference.

INTRODUCING IMPROV RELEASE 2.1– DESIGNED TO WORK WITH WORKGROUPS.



Another drag of the mouse to view the data by year. And because the formulas are right there, in plain English, it's easy to follow.

The new network ready edition of Improv with Q+E Extend* gives you unlimited flexibility to query and access database information. The Application Field Exchange feature enables OLE linking between Improv cells and Lotus Notes* fields. And Improv offers file compatibility with Microsoft* Excel and 1-2-3* files, including the new 1-2-3 Release 4 .WK4 file format. So you can work more easily with your data. And share this data more easily with your colleagues.

A consultant working with management teams uses Improv with Q+E Extend to access over 20 external databases containing sales, production, inventory and payroll information. He can bring data directly into Improv's multidimensional structure with ease, then immediately shuffle the data to see it in a variety of perspectives.

ADD IMPROV TO YOUR SPREADSHEET ARSENAL FOR JUST $199.

Improv has already sold more than 200,000 copies and is hard at work in all kinds of businesses. That's because Improv, as a companion to an existing spreadsheet or as a stand-alone, does some revolutionary things, things your traditional spreadsheet was not designed to do. And right now, you can buy Improv as a companion to your existing spreadsheet** for just $199 (SRP). Call **1-800-TRADEUP, ext. 9071******* for a free demo disk. Or visit your Lotus Authorized Reseller.

Lotus IMPROV

THE FIRST DYNAMIC SPREADSHEET FOR WINDOWS

of the kit, just call Lotus with your serial number ($10 to cover shipping and handling) **Qualifying spreadsheets include Lotus 1-2-3 for DOS and Windows,™ Excel for Windows, Quattro* Pro for DOS and Windows. Notes, Symphony and Improv are registered trademarks of Lotus Development Corporation. NeXT is a registered trademark of NeXT Computer, Inc. Microsoft is a registered trademark and Windows is a trademark trademark of Borland International, Inc.

Generate Reports

Output is where your database earns its keep. You expect high-impact reports, mailing labels, letters, and more.

If you can aim a mouse pointer and click on a button, you can turn raw data into a sophisticated report. And nothing does the job faster than Borland's Paradox and Software Publishing's Superbase. But if you want ease of use, go with Access.

Our testers were as dazzled by Microsoft's ReportWizards as they were by the FormWizards. They produced superb-looking reports, complete with embedded graphs, with little effort. If there's a downside to ReportWizards, it might be that they're too effective at shielding you from report-editing tools—testers found it difficult to go back and edit an existing report.

Working with Paradox is almost as easy as using Access's ReportWizards. Select the database, and Paradox presents you with a series of dialog boxes that prompt you for the table (or tables) to include, the style of report, and which fields to use. Like the forms builder, Paradox lets you preview the results before you click on OK. For tight deadlines, the Quick Report is one button away.

Superbase also has a Quick Report option that produces an attractive report with minimal effort. Click on an icon to call up the Quick Report dialog box, which is loaded with push buttons and is one of the program's best-conceived features. It's easy to define calculated columns with a calculatorlike control panel that includes powerful operators, such as LIKE for approximate matching of character strings. Surprisingly, several of our testers had trouble finding the Superbase Quick Report icon. Maybe Software Publishing should borrow an interface trick from Paradox, which displays an icon's functions whenever the mouse pointer passes over it.

Approach required more steps on average than the other three products for both creating and editing reports. Unlike the other products, Approach doesn't step you through a series of dialog boxes to create a report. Rather, you create a very basic outline of what you want in one dialog box, then switch to edit mode to make any further modifications.

If you want quick and snazzy reports, tune in to Access or Paradox. Superbase also ranked well (if you can find the Quick Report tool), but Approach proved too clumsy.

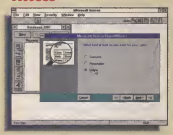
		Verdict
✓	**Microsoft Access 1.1**	**9.4**
	Borlond Paradox for Windows	9.3
	Softwore Publishing Superbose 2.0	9.2
	Lotus Approach for Windows 2.0	7.6

MORE MAGIC WIZARDS

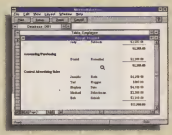
Less hassle, looks great.

If you liked them for creating forms, you'll love Access's ReportWizards for creating reports. With a few more steps than you need with form creation, you get truly professional reports. Approach makes quick reports easy, but they don't look as nice.

Access



Step 1
In one of the finol steps, you select the design of your report. It's o simple cosmetic step thot mokes the output first-closs.



Step 2
And the output is indeed first-closs. You con edit this piece of ort, but you'll probobly just send it stroight to the printer.

Approach

Step 1
Report creation is olso eosy in Approach, with its usuol orroy of well-chosen buttons ond useful menus for selection.

Step 2
But the finol result is, well, Sporton. Ploin. Dull. You'll hove to adjourn to the editor to moke this report look finished.

No doubt you've experienced the limitations of Windows.

Too slow. Too cluttered. And a little klutzy. Clearly, Windows has its imperfections. Fortunately, they're easy to fix. All you need is PC Tools™ for Windows software. It makes Windows faster, simpler, more fun—while it protects your data. Infoworld *concluded, "with the release of PC Tools for Windows, Central Point has in a single stroke grabbed the top spot as best Windows shell from Norton Desktop." We couldn't have said it better. And at $99 (from participating dealers) the advantages of PC Tools for Windows are really hard to ignore. If you're now using Norton Desktop, you can upgrade for only $69. Want more information?* **Just call 1-800-695-0678.**

Central Point Software

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professional quality grayscale scans to all your favorite Windows™ applications. *And* at about a third of the price of a flatbed scanner, you'll have no trouble keeping your budget balanced. Pick up ScanMan EasyTouch at your local dealer, or call **1-800-732-2904.**

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Performance

When does performance count most? Simple: When loading data from an existing file, indexing it, and querying it.

No mercy. That's what we showed these databases. Teaming up with ZD Labs, we subjected all four to a relentless barrage of performance tests. Because if a database isn't fast enough, you won't use it—no matter how powerful it is. When the marketing hype cleared, one database stood out: Paradox.

A database is useless without data, so the first thing you do with a database is to load it with information. We entered a half million rows into each database—enough to clearly see that Paradox and Approach led the others.

If a database is useless without data, data is just as useless without an index. Indexing boosts query performance by giving the database engine a quick way of looking up data. At more than twice the speed of the other products, Paradox wins this category hands down.

One of the most important aspects of indexing involves maintaining a unique key field. To check how database engines deal with nonunique key fields, our test database includes some duplicate entries. The ideal database places duplicate records in a special table that you can review later. Approach failed this test entirely. Superbase offered to remove the unique-key restriction, rather than fixing the problem. Paradox handled this situation perfectly, and Access handled it correctly but less conveniently.

You spend 90 percent of your time querying a database. So you expect snappy answers to your important questions. In our tests, there were no gray areas, no question of who won: Paradox. Its query speeds were five times faster than its nearest competitor's.

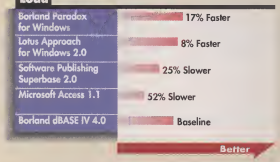
If sheer speed tops your database wish list, Paradox is your best choice: Nothing we tested can touch it.

		Verdict
✓	**Borland Paradox for Windows**	**10.0**
	Microsoft Access 1.1	8.8
	Lotus Approach for Windows 2.0	8.5
	Software Publishing Superbase 2.0	8.1

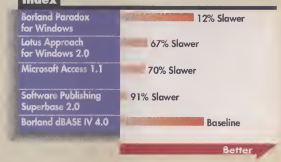
WHEN IT COMES TO SPEED . . .

Think Paradox for Windows all the way.

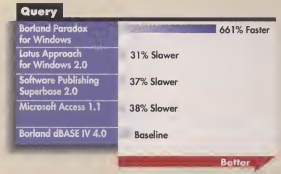
Paradox for Windows won in most of the performance tests ZD Labs ran. In fact, half the time it's faster than the leading DOS database—Borland's dBASE.



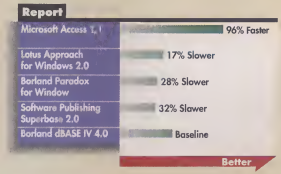
How fast are these databases at importing data? Compare how fast they can load a half-million rows.



Getting the jumble of imported data into a usable format takes a bit longer than it would with dBASE.



But querying is where Paradox really stood out—and that's what counts, because that's what you do most.



Access's moment of glory came when creating reports: It's nearly twice as fast as DOS powerhouse dBASE.

User Satisfaction

Where was that menu option again? All the power in the world doesn't matter if you can't figure out the database.

For overall productivity, our tests show that there's no match for Paradox: It gets more done in less time than any other product. But which database did our testers find most satisfying? Access by far.

A cynic would say that Access is the definitive Windows application: You like what you get when you're done, but it takes too much time to do it. Users lauded it with comments such as "very intuitive," and "the program felt right." They heaped praise on Cue Cards—online help that clearly shows you how to perform common database tasks—and the Wizards—which help with form and report design. But users also took longer to complete the tasks with Access than they did with Paradox. Access was clearly the product that our testers would most like to use if they weren't in a hurry.

Paradox is the product to use when you are in a hurry. Fewer keystrokes, fewer calls to online help, less time—that's the Paradox way. It, too, garnered a good user-satisfaction rating, though nothing can top Access's perfect score. Users particularly liked creating forms and reports with Paradox (two of the most important categories), but they became confused when they tried to join tables and complained that both the online help and the manuals were poorly organized and not very helpful.

Users preferred Approach to Superbase, but our tests showed that it took more time to complete most tasks in Approach. Users particularly didn't like using the program to create reports—"one of the worst I've encountered" was a typical reaction.

Like Paradox, Superbase earned a good productivity score, but it received the worst user-satisfaction score. Users complained that there were too many dialog boxes and manuals, and that the online help wasn't context-sensitive. They even accused the program of being obtuse in the way it merged two tables. But in one of the most important categories, report creation, Superbase nearly tied for top honors with Paradox, thanks to a remarkable one-button Quick Report option.

The bottom line is simple: Use Access if you want to enjoy working with a database, and use Paradox if you want to get the job done quickly.

		Verdict
✓	**Microsoft Access 1.1**	**10.0**
	Borland Paradox for Windows	9.3
	Lotus Approach for Windows 2.0	8.0
	Software Publishing Superbase 2.0	7.4

YOUR OTHER CHOICES

Roll out the flat-file databases and the dBASE clones.

How much power do you need in your database? Something that just outstrips your spreadsheet or a raw database engine that yields tremendous power—after you've invested weeks writing code? We tested some relational Windows databases, but there are plenty of others around. Undemanding database users go for flat-file databases, but power-hungry code slingers will prefer relational databases such as dBASE and its descendants.

Flat-file databases are essentially list managers that store information in one file. You can't join one file with another relationally—so you have to reenter a customer's name and address every time you prepare an invoice.

Relational databases use indexes and common fields to establish logical links between different files or tables. As a result, you can join similar data to make sure that important information is stored in a single location. The de facto standard for data files today is the one pioneered years ago by dBASE. The dBASE programming language (known as Xbase) is also popular among developers.

The leading flat-file database is Claris's $399 FileMaker Pro for Windows. Originally a Macintosh program, FileMaker debuted as a Windows program in 1992, making it good for sites that mix Macs and Windows PCs.

The relational-database field is more crowded. The king of Windows Xbase databases is Microsoft's $495 FoxPro for Windows. It offers an object-oriented application-development environment, a subset of the structured query language (SQL), and hooks into mainframe databases. Computer Associates' $550 CA-dBFast appeals to database developers, primarily because of its Visual Designer, a forms-based design tool that generates source code. Ace Software's $99.95 AceFile is especially well suited for migrating dBASE applications from DOS to Windows without a lot of hassle. Finally, there's DataEase Express for Windows, a $395 package from DataEase.

AceFile • $99.95 • Ace Software • 1740 Technology Dr., Suite 680, San Jose, CA 95110 • (800) 345-3223, (408) 451-0100
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DataEase Express • $395 • DataEase International • 7 Cambridge Dr., Trumbull, CT 06611 • (800) 243-5123, (203) 374-8000
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- 5.25" half height 200ms double speed CD-ROM (T6600C/CD and T6600C/CDV models only)
- MediaShare®Mambo™ DVI®/Ethernet™ board (T6600C/CDV model only)

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In Touch with Tomorrow

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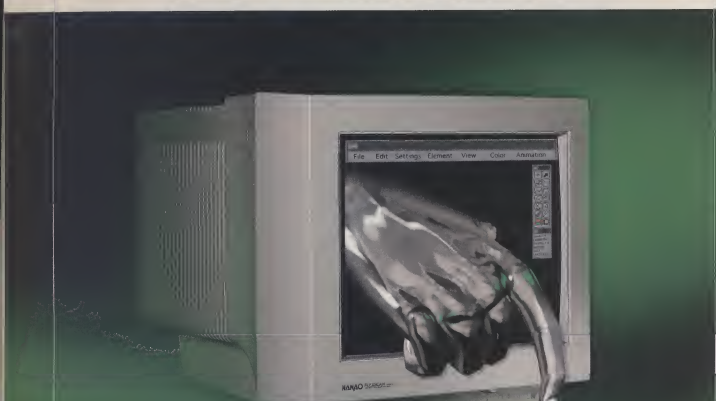

SO ADVANCED IT EVEN TURNS ITSELF OFF.

March 16,1993
FlexScan F 340/W

FlexScan F550i

Nanao, the technical leader in monitors has done it again. In addition to being the top choice of today's CAD/CAM, DTP and Windows users, Nanao's award-winning FlexScan monitors now have a remarkable energy-saving system — PowerManager.

PowerManager works with all green computer systems including VESA DPMS (Display Power Management Signaling). But users don't have to own a new green computer in order to take advantage of the PowerManager to save energy. Our PowerManager works with any existing PCs with a screen saver software, including Windows 3.1 and After Dark. Activating when the blank screen of the screen saver appears, PowerManager cuts operating power to less than 8% of total consumption. It also automatically powers the monitor down to a stand-by mode when the computer is turned off. The PowerManager can save users as much as $63 per year on utility bills (Source: E Source). PowerManager has placed Nanao at the forefront of the Environmental Protection Agency's Energy Star Program.

PowerManager is now the standard feature of our 15", 17", 20" and 21" monitors. All Nanao energy-saving monitors feature superior Invar Shadow Mask and Trinitron CRTs with non-flicker ultra-high resolution. Their ergonomic features include compliance with MPR-II/TCO low radiation emission standards and anti-reflective treatments. Best of all, they can power down. So when you're not working, neither are they.

Nanao FlexScan monitors. Intelligently designed. Incredibly useful. And now, built to help protect our environment by reducing energy consumption.

*The Energy Star emblem does not represent EPA endorsement of any product or service.

FlexScan T660i

FlexScan F550iW

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PCComputing USABILITY APPROVED

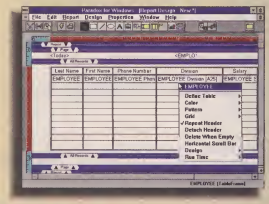
And the Award for Most Usable Goes to . . .

Paradox and Access: They prove hard to beat.

There's a dying myth that you can't have a powerful application that's easy to use. Our two usability winners drive a stake through the heart of that fiction: Paradox and Access have what it takes to make new users look like old pros.

How do we figure that? In our Usability Lab we count keystrokes, how many times users need to go to Help, and how quickly they get the job done. Then, we debrief them, asking specific questions about how satisfied they were with each product.

On efficiency, Paradox for Windows won hands down. It took almost no time to get most jobs done. But users were most satisfied with Access because its support features are so advanced.

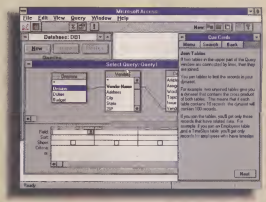


PCComputing USABILITY APPROVED

Score: 92.2

Paradox for Windows

In addition to being highly efficient, Porodox hos great menus. Click on on object with your right mouse button, and you can change parameters—no menus needed.

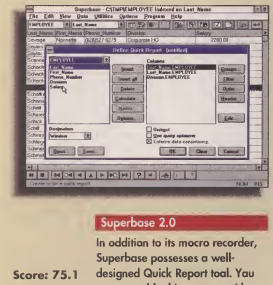


PCComputing USABILITY APPROVED

Score: 81.7

Access 1.1

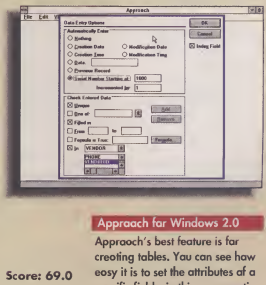
Wizords and Cue Cards make Access o beginner's dream. Use the Cue Cards for help; they'll step you through any task. And they stay anscreen while you work.



Score: 75.1

Superbase 2.0

In oddition to its mocro recorder, Superbase possesses a well-designed Quick Report tool. Yau get a good-looking report with minimal hassle.



Score: 69.0

Approach for Windows 2.0

Approach's best feature is far creating tables. You can see how easy it is to set the attributes of a specific field—in this case creating a unique vendar ID number.

The Basics

These are big products. Well-organized documentation and online advice aren't just options, they're essential.

When it comes to databases, there's no such thing as information overload. With the exception of Approach, each of these products comes with pounds of documentation. Access offered the best combination of manuals, phone support, and electronic aids. Paradox followed.

Access packs its entire user's guide into a superbly organized, context-sensitive help system, which includes pop-up windows that let you cut and paste sample code into your database applications. Wizards may get all the headlines, but Microsoft's Cue Cards are the most powerful form of online help yet devised, and Access takes full advantage of them. Cue Cards offer well-focused, interactive help, steering the user through multistep tasks.

Borland's Paradox deserves some kind of award for putting a Support Info item (which provides a guide to phone, fax, and online help options) right in the Help menu. The massive manuals include an 877-page guide to ObjectPAL; it's a shame that it's not easier to access through the Help system.

Despite Approach's modest size and its lack of a programming language, the program still fell short in support. The online help system is poorly organized and woefully incomplete. The F1 key didn't always summon online help. The Approach documentation also drew fire from usability testers, who found it inflexible.

Superbase tries to do the right thing, offering a wide array of online help options that include a guide to error messages (much needed, given the product's programmer orientation). Unfortunately, it too falls short. Superbase illustrates the difference between quantity and quality: Usability testers complained about help screens that use one obscure term to define another, error messages that are "as helpful as a left-handed monkey wrench," and a shelfload of separately bound manuals with no global index. It took one tester only 18 minutes to create a data table, but he searched for 24 minutes through three different manuals to find out how to index the records.

If you don't like manuals, you'll absolutely love Access; with its online help you'll never need to crack a book. Paradox, Approach, and Superbase should strive for this kind of clarity.

		Verdict
✓	**Microsoft Access 1.1**	**10.0**
	Borland Paradox for Windows	8.0
	Lotus Approach for Windows 2.0	7.0
	Software Publishing Superbase 2.0	6.7

HOW WE TESTED

Rating the best database.

Choosing the right database can save you time and trouble. We tore into each database to see which ones excel. We gave the products to ZD Labs for rigorous performance testing. Then we gave them to *PC/Computing*'s Usability Lab, which administered a series of tests with business users behind the wheel of each product. Finally, we weighted each factor to reflect its importance to business users.

CREATE A DATABASE.....10%
We checked for sensible default values and logically arranged dialog boxes. We then went back and modified each database by adding new tables and new columns to existing tables.

CREATE AND USE FORMS.....15%
Forms make it easy to enter and view data. We evaluated each product's tools to see if they created attractive and powerful forms.

QUERY DATA.....15%
We created several queries to evaluate the products' query-building interfaces, looking for automatic linking of tables on common rows and for a drag-and-drop metaphor.

AUTOMATE TASKS.....10%
Macro builders and programming languages came under our scrutiny here. We created applications to query databases and add buttons to forms.

GENERATE REPORTS.....15%
The final appearance of your data comes in the form of a report. Our tests involved creating new reports, saving them, and going back to edit them later.

PERFORMANCE.....10%
ZD Labs loaded each database with nearly a half million rows of data to determine which database was fastest at loading, indexing, and querying.

USER SATISFACTION.....20%
We invited experienced database users and novices into our lab to run the products through a scripted series of actions. They created databases, forms, reports, and applications, and they answered a series of queries.

THE BASICS.....5%
We evaluated each product's online help and documentation. In online help, we looked for products that gave step-by-step examples.

PC/COMPUTING SCORECARD

Faster than a speeding query, more powerful than a macro recorder . . .

Factors	Borland Paradox for Windows		Lotus Approach for Windows 2.0		Microsoft Access 1.1		Software Publishing Superbase 2.0	
Create a database 10%	9.4	Gets the job done quickly, but locks the simplicity of Access.	8.5	Strange nomenclature and usability problems hinder this product.	9.8	Delivers paint-by-numbers ease and Michelangelo results.	9.3	Like Paradox, a bit confusing but fast.
Create and use forms 15%	8.8	As powerful as Access and almost as easy.	6.6	Great tools, but saving and retrieving are problems.	8.9	FormWizards make working with forms incredibly simple.	8.7	A bit too convoluted for our taste.
Query data 15%	9.7	Simplicity itself. Kudos to the designers.	7.4	Saves queries as macros, which is counterintuitive.	9.6	Well-done point-and-click query building.	7.4	Too many nonstandard dialog boxes.
Automate tasks 10%	4.5	Any application requires you to write code.	6.5	No programming language but a good macro tool.	9.6	Includes clever macro tools and a programming language—what more could you want?	9.0	Great macro recorder writes code for you.
Generate reports 15%	9.3	Rip through reports with Paradox.	7.6	Compared to the others, Approach is clumsy.	9.4	ReportWizards do for reports exactly what FormWizards do for forms.	9.2	Once you find the Quick Report tool, Superbase does well.
Performance 10%	10	If we didn't limit it to a 10, Paradox would be a 22!	8.5	Follows closely behind Access.	8.8	It's not Paradox, but it's no slouch.	8.1	Even the slowest database performed well.
User satisfaction 20%	9.3	Completes tasks in less time than other products.	8.0	Good user satisfaction, but it's slow at many simple tasks.	10	Cue Cards, Wizards, and great documentation.	7.4	Too many dialog boxes hamper this product.
The basics 5%	8.0	You may have problems finding your way through help.	7.0	Online help needs help.	10	Best combination of manuals, phone support, and online help.	6.7	Manuals and online help fall short.
Total Score	**88.2**		**75.4**		☑ **95.0**		**82.5**	

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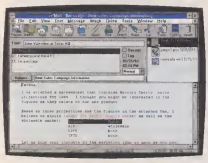

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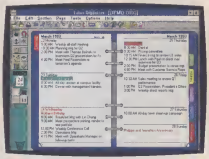

Lotus Organizer 1.1 – the same product that makes it easy to organize your day now makes it easy to schedule group meetings.

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DOS

Go Ahead, Make My Display: Light Up Your DOS

TIRED OF DRAB, WHITE-ON-BLACK TEXT? BRING OUT DOS'S TRUE COLORS WITH EXTRA SCREEN LINES, CUSTOM PROMPTS, AND MORE. **BY JEFF PROSISE**

WHEN IT COMES to screen handling, DOS has had a bum rap. Sure, it's no Windows—its default display is a Spartan black-and-white screen with 25 lines of text, and it shows color only with reluctance. But what many people don't realize is that DOS is capable of exerting far more control over the video hardware than it's usually given credit for. This month, we show you four ways to embolden DOS's interactions with the screen and inject some pizzazz into an otherwise pedestrian interface.

Before you try the examples that follow, load DOS's ANSI.SYS driver, which extends DOS's control over screen and keyboard operations. To load the driver in conventional memory, add the following command to your CONFIG.SYS file:

```
DEVICE=C:\DOS\ANSI.SYS
```

Then reboot to load ANSI.SYS. If you have a 386 or higher PC configured to load TSRs and device drivers in upper memory, save precious conventional RAM using the DEVICEHIGH command instead of DEVICE. The DEVICEHIGH command must come after the command that loads your memory manager (such as EMM386.EXE), and you need a DOS=UMB (or DOS=HIGH,UMB) statement somewhere in CONFIG.SYS.

Fill 'Er Up

Double your display by increasing the number of lines that DOS fits onscreen. Since DOS 4.0, the MODE command has been able to switch VGA screens to 50-line display mode and EGA screens to 43 lines. If you use MODE with full-screen applications that adjust their output when more than 25 lines of text are displayed (most modern-day DOS applications do), these display modes squeeze about twice as much information onscreen, which is helpful if you're editing a long text document or browsing through a large spreadsheet. Even the command line benefits: Type DIR with 50 lines of text displayed, and you'll fit twice as many filenames on the screen.

Switching to an enhanced display mode is easy. If your PC has a VGA or higher video adapter and ANSI.SYS is installed, type:

```
MODE CON: LINES=50
```

For EGA-equipped systems, use MODE CON: LINES=43 instead. To restore the default 25-line screen, type MODE CON: LINES=25 at the command prompt.

Manual switching with the MODE command isn't always necessary. The DOS Editor and QBasic Interpreter featured in DOS 5.0 and DOS 6.0 automatically switch to the highest display resolution your video adapter supports if you start them with an /H command-line switch.

Want to make EDIT default to high-resolution every time? Create a batch file in your DOS directory called EDIT.BAT that contains the following lines:

```
@ECHO OFF
EDITOR %1 /H
```

Then rename EDIT.COM to EDITOR.COM.

Likewise, the DOS shell defaults to the highest possible resolution if you start it with the command DOSSHELL /T:H (for text mode) or DOSSHELL /G:H (for graphics mode).

Jazz Up Your Prompt

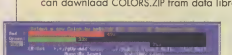
As long as ANSI.SYS is loaded, you can use it to add some fireworks to the command prompt. The default command prompt is nothing compared to the colorful and useful prompts you can create with ANSI.SYS.

The PROMPT command supports 13 special symbols to enhance the prompt

/// DOS Helper /////////////// PCContact

Colors Version 1.01

Sure, ANSI.SYS lets you specify the colors you want for the screen's foreground, background, and border, but you have to choose from a measly 16 colors. That's almost an insult to EGA and VGA users. Get access to all the colors your video card can handle with COLORS.COM, which lets you specify the exact proportions of red, green, and blue that make up each of the colors available to ANSI.SYS. With a VGA card, that means more than 260,000 possibilities. You can download COLORS.ZIP from data library 3 (Utilities/Misc.) on PC/Contact, *PC/Computing's* online service, or you can call the West Chester Group at (800) 525-9244.



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and display information (the $P symbol, for example, displays the current directory name, $T displays the time, and $_ moves the cursor to the next line).

That's not all—to further customize the prompt, embed ANSI escape sequences in the PROMPT command. Escape sequences are codes that ANSI.SYS uses to display colors, move the cursor, and more. Look for a complete list of ANSI.SYS escape sequences in your DOS manual, or type HELP ANSI.SYS to get online information in DOS 6.0.

There is almost no end to the prompts you can dream up. The following PROMPT command creates one of my all-time favorites: a blue banner at the top of the screen that displays the current drive, directory, time, and date in bright yellow:

```
PROMPT $E[s$E[H$E[1;33;44m$E[K
  $E[1C$P$E[1;36H$T$H$H$H$E[1;66H
  $D$E[0;37;40m$E[uCommand$G
```

This entire command should be entered on a single line in AUTOEXEC.BAT. It's important to enter characters exactly as shown—ANSI.SYS escape sequences, unlike standard DOS commands, are case sensitive.

Color the Screen

One of the most powerful features of ANSI.SYS is its ability to set the screen to the colors you want. With ANSI.SYS installed, use this command in a batch file (or AUTOEXEC.BAT) to change the screen colors to bright white on blue:

```
ECHO <ESC>[1;37;44m
```

Do not type the characters <ESC> as shown—instead, embed an escape character, ASCII 27. If you use the DOS 5.0 or DOS 6.0 Editor (invoked with the EDIT command), enter an escape character by pressing Ctrl-P followed by the Esc key. The escape character appears on the screen as a small left arrow. In some editors, you type an escape character by holding down the Alt key and typing 027 on the numeric keypad.

In the above command, 1 selects bold foreground colors, 37 specifies a white foreground, and 44 specifies a blue background. For less intense

Hot Tips

Double Up Your RAM Drive with DoubleSpace

RAM drives provide lightning-fast access to programs and files, but they take up valuable memory. Make the most of your RAM drive by compressing it with DoubleSpace. A compressed RAM drive holds about twice as much information as an uncompressed RAM drive of the same size, and although it's about half as fast as an ordinary RAM drive, it's still much faster than a hard disk.

Because DoubleSpace can't automatically configure a compressed RAM drive, you have to do it manually. Here's how to set up the RAM drive, compress it, and make it available whenever you reboot. You'll need at least 3MB of RAM.

To create a RAM drive, add the following command to your CONFIG.SYS file. Place it after the line that loads EMM386.EXE:

```
DEVICE=C:\DOS\RAMDRIVE.SYS 2560 /E
```

The number 2560 is the size of the RAM drive to be created, in bytes. You must specify at least 1,200 bytes, and you should use a multiple of 512. The /E switch puts the RAM drive in extended memory. If you're using expanded memory, use /A instead.

After you've made the changes to CONFIG.SYS, reboot your computer. DOS will create a RAM drive using your system's first available drive letter. To create a compressed RAM drive, type the following statement at a command line, replacing *D:* with your RAM drive's letter:

```
DBLSPACE /CR D:
```

DoubleSpace creates a compressed drive using your RAM drive as the host, simultaneously telling you which drive letter it's using for the compressed drive. Once it's done, adjust the size of the compressed drive. At a command line, type DBLSPACE /SIZE=1000 *G:* (*G:* is the drive letter of your compressed RAM drive). DoubleSpace responds with a statement that the size you've specified (1,000MB) is too large and tells you the maximum and minimum permissible sizes. To make the DoubleSpace drive as large as possible, repeat the /SIZE command using the maximum allowable size. For example, if DoubleSpace lists the largest possible size for drive *G:* as 2.49MB, type the following command:

```
DBLSPACE /SIZE=2.49 G:
```

Once you've maximized the compressed drive, you can't fit any information onto the host RAM drive—but the compressed drive will hold a great deal more.

Finally, add the two commands you used to create the compressed RAM drive (DBLSPACE /CR *D:* and DBLSPACE /SIZE=2.49 *G:* in this example) to AUTOEXEC.BAT. Save your changes, then open CONFIG.SYS and add the following statement to move the DoubleSpace driver into upper memory:

```
DEVICEHIGH=C:\DOS\DBLSPACE.SYS /MOVE
```

Your compressed RAM drive is ready. It will be set up the same way at each boot-up.

LINDA ROHRBOUGH
VAN NUYS, CALIFORNIA

Safeguard AUTOEXEC.BAT

Tired of installation programs mangling well-planned AUTOEXEC.BAT files? You'd think you could fix the problem with the new /K switch in DOS 6.0's COMMAND.COM, which lets you specify an alternate startup file for DOS. But Microsoft recommends

CONTINUED ON PAGE 302

foreground colors, use a 0 in place of the 1. For other colors, use this table:

ANSI.SYS Color Codes

Color	Foreground Code	Background Code
Black	30	40
Red	31	41
Green	32	42
Yellow	33	43
Blue	34	44
Magenta	35	45
Cyan	36	46
White	37	47

To change the colors displayed by these ANSI codes, use this month's DOS Helper, on page 301.

Pump Up the Cursor

Laptop users know how hard it is to locate the underline cursor on LCD screens, mostly because of the low contrast of the displays. DOS has no command to enlarge the cursor to a block, but you can create such a command with this DEBUG script. Use an ASCII text editor such as DOS's Editor to create a text file called BLOCKCUR.SCR that contains the following lines:

```
N BLOCKCUR.COM
E 0100 B4 12 B3 10 CD 10 B1 07
E 0108 80 FB 10 74 0D 33 C0 8E
E 0110 C0 26 8A 0E 85 04 FE C9
E 0118 EB 0D B4 01 32 ED CD 10
E 0120 B4 4C CD 21
RCX
24
W
Q
```

Enter a blank line after the final Q.

To create the executable program BLOCKCUR.COM, type the command DEBUG < BLOCKCUR.SCR Now, to switch to a block cursor, type BLOCKCUR at a command prompt, or enter the command in AUTOEXEC.BAT so that it runs every time you boot up. The block cursor appears at the command line and in some DOS programs, although some programs will change it back to an underscore. To return to an underline cursor, type MODE 80. *Note:* If you don't want to type in this script, download BLKCUR.COM, ready to run, from data library 3 (Utilities/Misc.) on PC/Contact.

Hot Tips

CONTINUED FROM PAGE 301

that you not use the /K switch on the SHELL line that loads COMMAND.COM in CONFIG.SYS. Instead, follow these steps to keep AUTOEXEC.BAT clean.

First, rename AUTOEXEC.BAT as STARTUP.BAT. Then enter this line in an ASCII text editor, and save the file in your root directory as AUTOEXEC.BAT:

```
STARTUP.BAT
```

The next time DOS boots, AUTOEXEC.BAT passes control to STARTUP.BAT. Because AUTOEXEC.BAT is a single line, you can easily identify changes to it after an installation program has modified it. If the changes make sense, add them to STARTUP.BAT—otherwise delete the added lines.

RONNY RICHARDSON
CHAMBLEE, GEORGIA

DOSKEY Dialing Demon

Tired of repeatedly dialing the same phone numbers? If you have a modem that shares a line with your phone, use DOSKEY to create a command-line phone dialer. It not only dials the phone for you but also remembers all the phone numbers you've dialed during the day, so you can redial any of them with the touch of a key.

First create a DOSKEY macro that sends AT commands to your phone to dial a number. Use a text editor such as DOS's EDIT to open AUTOEXEC.BAT and add this:

```
DOSKEY /BUFSIZE=1024 DIAL=ECHO ATDT$1 $G COM1 $T PAUSE $T ECHO
  ATH $G COM1
```

If your modem is on a COM port other than COM1, change the two COM1 statements to the correct COM port. Also, if your phone uses pulse dialing instead of touch-tone dialing, change the command ATDT$1 to ATDP$1. The /BUFSIZE=1024 switch sets DOSKEY's command buffer to 1,024 bytes, which should be enough to hold about 50 to 60 commands, including phone numbers you dial. If you find that this isn't enough, specify a buffer size of 2,048 bytes or more.

Save your changes, exit the text editor, then reboot your computer. To dial a phone number, type DIAL on the command line followed by the phone number. When you press Enter, the modem dials the number. Pick up the handset. When you hear the ring tones, press any key to disconnect the modem.

To redial any number, just press the up arrow until you see the number you want, then press Enter.

DYLAN TWENEY
ASSOCIATE EDITOR

Print DOS Graphics Screens

Try to hit the PrintScreen key when you're in a DOS-based graphics program, and all you'll get from your printer is garbage. But load DOS's GRAPHICS program first, and you'll get a perfect copy of your screen. GRAPHICS supports the most popular printers, including Hewlett-Packard LaserJets and some color printers. To use the program, just type GRAPHICS followed by the name of your printer—for an HP LaserJet-type printer, for example, you'd use this command:

```
GRAPHICS LASERJET
```

Open the application you want to print the screen from, and press Shift-PrintScreen.

To use this program, you must have a supported printer. In DOS 6.0, type HELP GRAPHICS to find out what kinds of printers are supported. With DOS 5.0, you need to check the manual. You can use most Epson-compatible printers if you change the emulation to IBM Graphics and type GRAPHICS GRAPHICS at a DOS prompt.

MICHAEL LEW
URBANA, ILLINOIS

Expert Mouse 4.0

File Options Window Help

It won't hop.

It won't skip.

But just wait till you see it jump.

Finally. A trackball with software as advanced as its hardware.

Total Cursor Control
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Define. Click. Jump.
First, you define your HotSpots. For example, the "Save," "Undo" and "Print" icons in Word for Windows.

Second, you click a button and move the ball slightly toward the HotSpot.

Third, well there really is no third, because Expert Mouse 4.0 does the rest — automatically jumping the cursor right where you want it.

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At your command.
With our programmable mouse buttons, you can automate the Windows functions you use most often. Click and drag. Send keyboard macros. Lock on an axis. Move pixel-by-pixel. Jump to a HotSpot. Send a double click. Even send combinations with just a single click.

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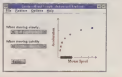

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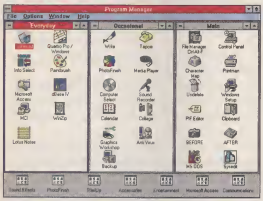
Stinson's Favorite Secrets: Ten Best Tips of All Time

OUR GREATEST HITS SHOW YOU HOW TO PUMP UP, SPEED UP, AND CLEAN UP WINDOWS. BY CRAIG STINSON

FOR MORE THAN three years, this column has been my monthly preoccupation. During that time, I've poked around the Windows interface, looked for ways to make Windows a notch quicker or simpler, and passed my ideas along to you. But as everyone knows, life is a series of passages, and the time has come for me to move on to other things. As a finale, I offer my own top ten productivity tips, culled from these columns.

1. Straighten up your desktop. If you're often flipping through group windows to find the program icons you want, it's time to overhaul your desktop. Create three tiled group windows, called Everyday, Occasional, and Main, for the applications and utilities you use most. Once you've set up your desktop this way, the icons you need will be at your fingertips. To keep the arrangement up-to-date, periodically weed out items you no longer use; and when you install a new application, copy those items you want from the application's group windows into the Everyday or Occasional group.

If you don't have enough screen space to keep all your regular icons visible at once, try squeezing them closer together. First, hold down Alt, double-click on each program item to call up its Properties dialog box, and abbreviate the icon title (or if the icon by itself is sufficient, substitute a single space for the title). Then open Control Panel, double-click on the Desktop icon, and reduce the Icon Spacing setting. Click on OK, and close Control Panel. In Program Manager, choose Window, Arrange Icons to pull the icons closer together.



Find items on your desktop quicker: The Everyday and Occasional groups contain most of your apps. The Main group holds often-used utilities and tools.

2. Use, but don't abuse, SmartDrive. SmartDrive speeds up disk performance markedly, but don't make its cache too big. For most users, a 1MB cache is plenty. Devoting more memory than that to the cache offers diminishing returns, since the additional cache hits become fewer. You'll enhance performance more if you leave the extra memory for your applications to use, thereby reducing the use of your swap file.

3. Donate 1MB to RAMDRIVE. If you have 8MB of RAM or more, create a RAM disk and point the environment variables TEMP and TMP to it. You'll boost the speed of applications (including Print Manager) that use temporary files. But RAM-disk memory reduces application space, so use it judiciously—1MB is plenty. In DOS 5.0 or 6.0, add the following line to your CONFIG.SYS file to create a 1MB RAM disk in extended memory:

```
DEVICEHIGH=C:\DOS
  \RAMDRIVE.SYS 1024 /E
```

When you reboot your system, RAMDRIVE creates a RAM disk using the next available drive letter on your system. To send temporary files to the RAM disk, add the following lines to your AUTOEXEC.BAT file and reboot:

```
SET TEMP=D:\
SET TMP=D:\
```

If your RAM disk uses a drive letter other than D:, simply substitute the correct drive letter in the two lines.

4. Conserve your resources. If your applications use up Windows' three 64K resource heaps, your system will slow to a crawl and may crash, even if you have megabytes of regular memory to burn. To check the status of your resource heaps, switch to Program Manager and then select Help, About Program Manager. If the System Resources reading falls below 25 percent, play it safe: Close a few windows to regain some resources.

A better way to monitor resources is to use a resource gauge. Many of these programs sound an alarm if resources drop below a critical level. Many Windows shells and utilities, such as Norton Desktop for Windows and Central Point's PC Tools for Windows, include resource gauges. If you have a gauge, use it.

5. Economize on pixels. It's more of a strain on your system to use 256-color screen drivers than 16-color drivers, and high-resolution screens are slower than low-resolution screens. If the sole purpose of your 256-color driver is to let you display exotic wallpaper, you should switch to a humbler but faster 16-color driver. If you only occasionally need a high-resolution, high-color display, use Windows Setup to switch to that display mode when you need it, then switch back when you're done.

6. Don't fatten up on fonts. Installing fonts you seldom use slows down your system. Windows takes longer to load, because every font has to be attached to the system at startup. And applications'

Winapp of the Month

Mega Edit

Looking for a killer Windows text editor to handle large files? Try Mega Edit. Besides allowing you to edit text files of any size, it includes a split-screen view, the ability to export a file in Macintosh and Unix text formats, and more. Mega Edit is shareware and can be downloaded as MEGEDT.ZIP from PC/Contact's data library 3 (Utilities/Misc.). Or you can purchase it for $35.50 from Computer Witchcraft, 333F Distillery Commons, Louisville, KY 40206-1919.

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font dialog boxes can take forever to appear if you have a host of fonts. To keep your system lean and mean, use Control Panel's Fonts tool to remove extra fonts. You don't have to delete them from your disk; just select the ones you want, and click on Remove. When a dialog box asks you to confirm the deletion, be sure the Delete Font File from Disk box is not selected. Then click on Yes to remove the font. If you need to use the unloaded font later, you can use Control Panel to reinstall it—the font files remain on your hard disk in the same location. Just click on Add, Navigate to the directory where the font files are located, and select the fonts from the list. Click on OK to reinstall them.

7. Print faster with DOS interrupts. By default, Windows uses a direct-to-port printing routine that is supposed to make documents print faster by bypassing DOS's print routines. You may actually get quicker printing, however, by turning this option off. With "fast" printing off, Windows passes control of the printer port to DOS. You'd expect that extra step to slow things down, but DOS relinquishes CPU control less frequently than Windows' direct-to-port routine does. The bottom line: Paper hits the tray sooner; but keep in mind that your foreground application may run a little slower since it's getting fewer clock cycles.

To turn off direct-to-port printing, open Control Panel, double-click on the Printers icon, select your printer, then click on Connect. Deselect the check box labeled Fast Printing Direct to Port, then click on OK.

8. Know what you're installing. Deleting or moving Windows applications is a genuine pain. The only way you can do it successfully is to track everything that changes or is added when you install each application. This means making copies of WIN.INI and SYSTEM.INI before you install a program, and comparing those copies with WIN.INI and SYSTEM.INI once the program is installed. Do the same with PROGMAN.INI and CONTROL.INI, and make a note of any new INI files added by the application. And because many installation routines modify CONFIG.SYS and AUTOEXEC.BAT, it's a good idea to check those files for changes, too. You also need to note any new directories and files that are added to

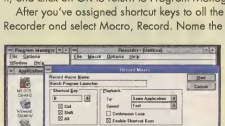
Hot Tips

Launch Multiple Apps from a Single Icon

If you work with more than one program or file when you do word processing, go online, or perform other tasks, use this Recorder tip to create a suite of frequently used apps and files that you can launch from a single Program Manager icon.

Start by assigning shortcut keys to the Program Manager items you want to include in your suite launcher. Select each item in turn, and press Alt-Enter to call up its Properties dialog box. If you want to launch any of these applications with a document already loaded, put the document's filename (and path, if it's not in the program item's working directory) after the item's command line. For example, to run Notepad with a file called TODO.TXT loaded, use the command line NOTEPAD TODO.TXT. Then assign a shortcut key to the item, make a note of it, and click on OK to return to Program Manager.

After you've assigned shortcut keys to all the programs you want, start Recorder and select Macro, Record. Name the new macro Batch Program Launcher, and assign it the shortcut key Ctrl-Shift-Alt-B. Select Playback To: Same Application and Playback Speed: Fast, and make sure that the Record Mouse box is set to Ignore Mouse. Then click on Start to begin recording the macro.



Back in Program Manager, press one of the application shortcut keys you assigned. Then press Alt-Tab to return to Program Manager, and press another keyboard shortcut. Repeat the process until all the programs are running. Then press Ctrl-Break, select Save Macro, and click on OK. Switch to Recorder and choose File, Save to save the macro file as BATCH.REC.

In the Program Manager group, select File, New, Program Item. Type RECORDER -H^+%B BATCH.REC in the Command Line box. The -H switch signifies that the following characters are the key combination for the macro: The ^ means Ctrl, the + means Shift, and the % means Alt. Once you have entered a description of the icon, click on OK. Whenever you want to call up the application suite, just double-click on the icon. Make sure that you close Recorder after all your applications are open.

MATTHEW LAKE
ASSOCIATE EDITOR

An Ounce of Easy Prevention

Guard against Windows mishaps by backing up your configuration files regularly. If you use a backup program, include all the INI and GRP files in your Windows directory in your regular backup routines. If you don't use a backup program, use File Manager to create a new directory on your hard disk called WINBAK. Switch to your Windows directory, and choose File, Select Files. Type *.INI in the Files box, and click on Select. Then click on Close to return to File Manager, and drag the selected files into the WINBAK directory. Repeat the process for GRP and DLL files. In addition, check the SYSTEM subdirectory for DLL files, and back up those as well.

If you ever need to restore Windows after an unexpected problem, reinstall Windows from the original program disks. Then copy all the INI, GRP, and DLL files from either your backup or WINBAK into your Windows directory. Your original desktop settings will be intact.

If Windows greets you with a message saying it can't read a program group,

CONTINUED ON PAGE 308

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your \WINDOWS and \WINDOWS\SYSTEM directories. If you later need to remove an application, these notes will make it easy to delete all its files from your hard disk and clean up references to it in your INI files.

9. Turn off background processing for DOS programs. Background processing for DOS applications lets them work even when they're in the background—but it consumes CPU clock cycles like nothing else. Unless you simply must have your DOS program churning away after you return to the Windows desktop, be sure the background processing option is turned off.

To turn off background processing for an application with a program information file (PIF), start the PIF Editor and open the program's PIF. Make sure the Background Execution box is not selected, then save your changes. Before turning off background processing for an active DOS application, ensure that it's in a window (press Alt-Enter to switch if it's full screen). Select Settings from the window's control menu, and make sure the Background check box under Tasking Options is not selected. Then click on OK.

10. Take shortcuts. Why reach for the Edit menu when, in most Windows programs, you can use Ctrl-C to copy, Ctrl-X to cut, and Ctrl-V to paste? Just because the environment is graphical doesn't mean you have to grab the mouse every time you want to use a command. The keyboard is quicker than the mouse, so learn to use the shortcuts—you'll have all of Windows' power at your fingertips.

Other shortcut keys to use are Ctrl-Esc, to bring up the Task List, and Alt-Tab, to switch among currently running applications. Select menus by pressing Alt plus the underlined letter on the menu title, and select a menu item by pressing its underlined letter. In dialog boxes, use Tab and Shift-Tab to move between controls, press Enter instead of clicking on the OK button, and press Esc if you want to cancel the dialog box.

Finally, assign Program Manager shortcuts to your most frequently used programs. You'll be able to start them with a keystroke from Program Manager. Plus, once a program with a shortcut key is already running, you can bring it to the front at any time simply by pressing its hotkey.

Hot Tips

CONTINUED FROM PAGE 306

exit Windows and copy the group's GRP file from your backup to the Windows directory. Then restart Windows—your group will be restored.

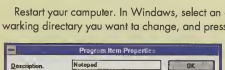
LENNY BAILES
SAN FRANCISCO, CALIFORNIA

Redirected Working Directories

To make file searching easier, store related files in a single working directory. Then, use a DOS environment variable to specify each program's default working directory. First, add a line to AUTOEXEC.BAT that defines an environment variable called WORKING that holds the name of your current working directory. To set the working directory to C:\DATA\OCTOBER, use this line:

```
SET WORKING=C:\DATA\OCTOBER
```

Restart your computer. In Windows, select an application icon that has a working directory you want to change, and press Alt-Enter to call up its Program Item Properties dialog box. In the Working Directory line, type %WORKING% to set the default directory to that listed in the WORKING variable. Click on OK to return to Program Manager. When you need to change the working directory for these applications, change the SET WORKING line in AUTOEXEC.BAT to reflect the new directory. When you restart your computer, the new directory will be in effect.



DYLAN TWENEY
ASSOCIATE EDITOR

Take Control of Terminal

Windows' Terminal doesn't retain communications settings from one session to the next. If you're using settings that differ from the defaults, you need to reset them every time you restart Terminal. Save time by creating a default TRM file with settings that take effect every time you start Terminal. Configure Terminal's defaults. Then choose File, Save As, and save the file as DEFAULT.TRM. To make the settings in DEFAULT.TRM load automatically, select the Terminal icon in Program Manager. Press Alt-Enter to open the Program Item Properties dialog box, change the command line to TERMINAL.EXE DEFAULT.TRM, then save the changes and return to Program Manager.

LENNY BAILES
SAN FRANCISCO, CALIFORNIA

Keep System Files Within Reach

When you need to change a system-file setting, it's tedious to negotiate Notepad's File Open dialog box. SYSEDIT.EXE offers a better way: It opens WIN.INI, SYSTEM.INI, CONFIG.SYS, and AUTOEXEC.BAT all at once—but it's limited to those four.

For instant access to any system file, create a Program Manager icon to open it in Notepad. Copy the Notepad icon by holding Ctrl and dragging the icon to a new location. Then hold Alt as you double-click on the new icon to call up its Properties dialog box. Change the title to Edit WIN.INI and the command line to NOTEPAD.EXE WIN.INI. Click on OK. Repeat this for other system files you often modify. If a file isn't in the Windows directory, specify its directory in the Working Directory line.

For INI files you modify less often, choose File, Run from Program Manager. Type the filename and click on OK to open it in Notepad. Since the default association for INI files is Notepad, this opens Notepad with the file you requested.

DYLAN TWENEY
ASSOCIATE EDITOR

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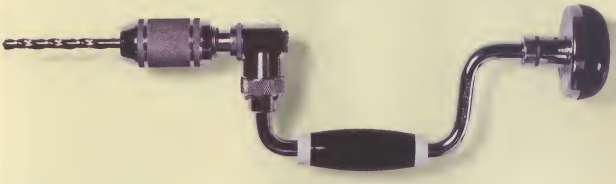

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WORD FOR WINDOWS

FAST FOREIGN PHRASES

Do you search through symbol fonts each time you type foreign words? Assign key words and phrases—such as *español* and *résumé*—to the glossary, and you can call up each one with a keystroke. First, type the word as it should appear. Then select Insert, Symbol and select the *ñ* and *é* characters. Select the word, then choose Edit, Glossary, and type the word without the special characters. Click on Define to create the glossary entry. To insert the word, type the plain-text name you picked in the glossary and press F3—Word will replace it with the correctly accented version.

BILL McCORMICK
MORGANTOWN, WEST VIRGINIA

MOVE TEMPLATE MACROS

You've just finished writing a macro for a new template when you think of another template that could also use it. No problem, as long as you have Word for Windows 2.0. Simply add InstallMacro to your list of available macros.

Open NEWMACRO.DOC in the Word for Windows program directory. Select InstallMacro from the list, and click on Install. You can add the macro to a menu and specify a destination template, such as NORMAL.DOT. Highlight the target template, and click on OK.

To copy a macro from one template to another, select Tools, Macro, InstallMacro. Choose the macro from the Macro to Install list, select the destination template from the Copy/Move To list, and click on Copy. Next time you use the second template, the macro will be available.

CHRISTINE GRECH
ASSOCIATE EDITOR

WORDPERFECT 5.1

PROTECT TAB SETTINGS

Do you find yourself constantly readjusting tab stops every time you create a table or side-by-side list in a WordPerfect 5.1 document? Cut the amount of work in half by building tables inside WordPerfect's Graphics boxes.

To use this handy feature, press Alt-F9 to select a figure, table, text, or user box. Next, select 1 to create the box and then 9 to edit it. Now you can set the tabs by pressing Shift-F8, 1, 8. The tabs you've set up inside the graphics box do not affect the surrounding text.

WILLIAM J. WOLFE
CHAMPAIGN, ILLINOIS

WORDPERFECT FOR WINDOWS

PRINT COPIES QUICKLY

Printing several copies of a document can tie up your computer and send you running for the coffee machine.

Step by Step: WordPerfect 6.0

JUMP BETWEEN DOCUMENTS WITH HYPERTEXT BUTTONS

WordPerfect 6.0's hypertext buttons put you a mouse click away from any document and make it easy to move within or between documents. Use a "cardfile" document to hold buttons for boilerplate documents.

Step 1. Create a bookmark in the destination document.
Place the cursor where you want the bookmark. Choose Edit, Bookmark, Create, then type a bookmark name and choose OK. Save and close the document.

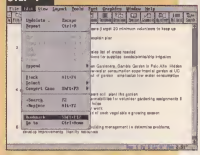
Step 2. Create the hypertext button.
Open the document where the button will be located and choose Tools, Hypertext, Create Link. In the Create Hypertext Link dialog box, select Go to Other Document, type the filename, press Tab, and type the bookmark's name. Choose either Highlighted Text or Button (Graphic) to format the button as underlined boldfaced text or a button graphic. Click on OK.

Step 3. Customize the button and activate the link.
To edit hypertext buttons, choose Tools, Hypertext, and deselect the Hypertext Is Active box. To relocate a button, place the cursor over it and hold the left-mouse button while you drag it to the new location. Click on a hypertext button to display image handles for resizing the button. Double-click on a button to open the Edit Graphics Box dialog box, where you can create text to be displayed in the button.

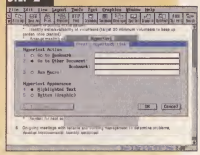
To perform a hypertext "leap," choose Tools, Hypertext; be sure that the Hypertext is Active box is selected; and click on the button. To jump back through your most recent hypertext leaps, choose Tools, Hypertext, Return from Jump.

GEORGE R. BEINHORN
CONTRIBUTING EDITOR

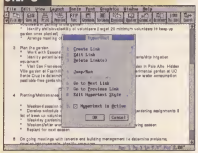
STEP 1



STEP 2



STEP 3



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Make the printer, rather than your computer, handle the copying. Select File, Print, specify the number of copies, and under Copies Generated By, select Printer. Then click on OK to print. If your document has several pages, they won't be collated, but they'll print much faster.

SALLY NEUMAN
SYSOP, PC/CONTACT

AMI PRO

MAIL-MERGE TO AN AREA CODE

When you want to target a specific market, a conditional mail merge is a great way to send letters to all customers in one city or state. But what if you want everyone in one area code but you don't have an area-code merge field? Use this trick.

If you want to merge all records for area code 404, and the phone numbers are in a field named PHONE, follow the normal merge steps. When you are ready to merge and print the data for the document, select With Conditions and click on Conditions. In the dialog box, specify the following:

```
If PHONE>=404-000-0000
 AND
If PHONE<=404-999-9999
```

Ami Pro will print letters for all customers in the 404 area code.

CHRIS SANDLUND
ASSISTANT EDITOR

'RITHMETIC 'N' WRITIN'

Ami Pro can be a powerful report generator when you combine the merge capability with a macro that performs calculations. If you have a spreadsheet of salespeople and their sales figures, you can draft a letter detailing their quarterly commissions and make Ami Pro calculate their sales values during the merge.

Create the merge data file (the spreadsheet) and the letter. Position the insertion point at the location of the first calculation to be performed in the standard document. Choose Edit, Power Fields, Insert. Under Fields, select FormatNum$. Ami Pro places FormatNum()$ in the Insert Power Fields edit box. Between the internal set of parentheses, type the rest of the

Step by Step: Microsoft Access

CHECK FOR DUPLICATE RECORDS DURING DATA ENTRY

Create an automated form that checks the first field in each new record to see if a matching record already exists in the database. *Note:* You'll need a counter field in your table for the code to work properly.

Steps 1 and 2. Enter the code that checks for duplicates.
Create a new module. Select Edit, New Procedure, type CheckNewRecord under Name, and click on OK. Between Function CheckNewRecord() and EndFunction, type these commonds. Replace the itolicized words with the nomes of your dato table, its counter field, the field you wont to check ogainst for duplicates, and the appropriate form.

```
If (IsNull(Forms![Form
 name]![Counter field])) Then
If (DCount("[Field to check]",
 "Table name", "[Field to
 check]=Forms![Form name]![Field to
 check]")) > 0 Then
Response = MsgBox("You already have
 one or more records with that
 name. Do you still want a new
 record?", 4)
DoCmd GoToRecord A_form, "Form
 name", A_last
If Response = 7 Then
Newname = Forms![Form name]![Field
 to check]
DoCmd DoMenuItem A_FormBar, A_Edit-
 menu, A_Selectrecord
DoCmd DoMenuItem A_FormBar, A_Edit-
 menu, A_delete
DoCmd FindRecord Newname
End If
End If
End If
```

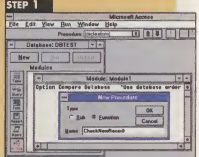
Select Run, Compile All to check the code. Save your changes, and close the madule window.

Step 3. Open the form in Design mode.
In the database window, select Farms, your data-entry form, and Design. Double-click an the text-entry box for the field you're checking ogainst ta open its Properties dialog box.

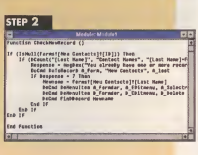
Step 4. Add the new function.
Type =CheckNewRecord() in the After Updote box to make the form run CheckNewRecord each time the field is modified. Save your changes, ond close the Properties box.

KAREN JENSEN
SAN FRANCISCO, CALIFORNIA

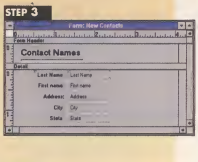
STEP 1



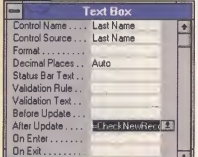
STEP 2



STEP 3



STEP 4



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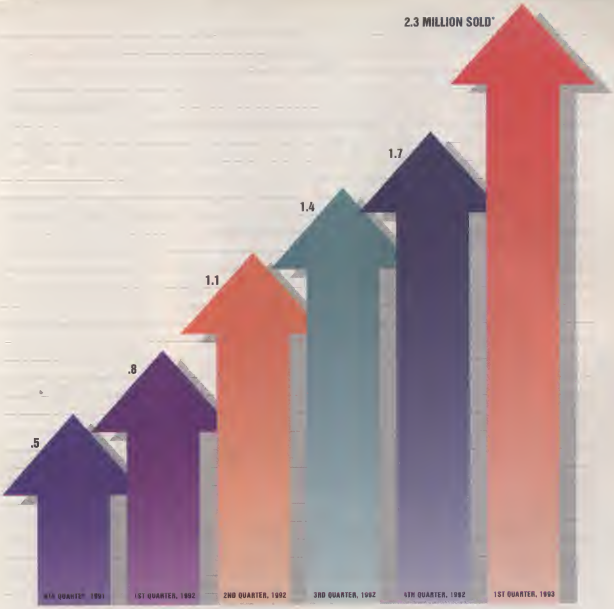

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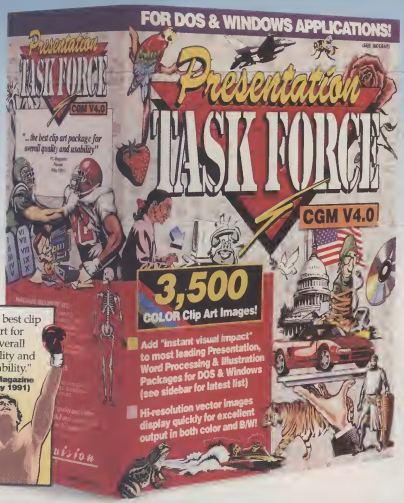

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formula that you want. In the formula

```
FormatNum$("","",2,(SalesQ3*0.05))
```

SalesQ3 is the field name in the merge data file. The sales figure is multiplied by 0.05, representing a 5 percent commission. You can also perform addition, subtraction, or division using the +, –, or / symbol. *Note:* Percentages must begin with a zero before the decimal.

Choose OK to close the Insert Power Fields dialog box, choose File, Merge, Merge & Print, and specify Merge & Print. The calculations are automatically performed on each record in the merge data file.

CHRIS SANDLUND
ASSISTANT EDITOR

FOXPRO 2.5

AN ALTERNATIVE ENTER KEY

If you have gotten tired of hitting Enter to execute selected commands, make your right-mouse button act as your Enter key. Select File, New and in the New dialog box click on the Program button and then New. Enter the following line in UNTITLED.PRG:

```
ON KEY LABEL RIGHTMOUSE KEYBOARD
  CHR(13)
```

Save the file as MYSTART.PRG and close it. Next, in the command window, type MODI FILE CONFIG.FPW. Add the line COMMAND=DO MYSTART.PRG as the last line of CONFIG.FPW and save the file. Now the right-mouse button doubles as the Enter key in FoxPro.

WILLIAM BEEM
ORLANDO, FLORIDA

MICROSOFT ACCESS

NO EXTRA SPACES, PLEASE

When you need a clean report, blank fields where a middle name is missing won't do. If your database includes fields for Term of Address, First Name, Middle Initial, and Last Name, the Access Report Wizard creates an expression like this:

```
=[Term of Address]&" "&[First
  Name]&" "&[Middle Initial]&"
  "&[Last Name]
```

To ensure that a blank field does not impair the look of your report, change to the report's design view and click on the text box that contains the above expression. Then add the following IIF statement, separating each line of the code with a semicolon:

```
=IIf([Term of Address] Is Null and
  [Middle Initial] Is Null, [First
  Name]&" "&[Last Name];
IIf([First Name] Is Null and [Mid-
  dle Initial] Is Null, [Term of
  Address]&" "&[Last Name];
IIf([Middle Initial] Is Null,
[Term of Address]&" "&[First
  Name]&" "&[Last Name];
[Term of Address]&" "&[First
  Name]&" "&[Middle Initial]&"
  "&[Last Name])))
```

Now your reports will look good no matter which field is blank.

KAREN JENSEN
SAN FRANCISCO, CALIFORNIA

DBASE IV

EASY JULIAN NUMBERS

While most Xbase dialects have a function for determining the Julian number for a given date, dBASE IV does not. A Julian number is the number of days that have elapsed between the current date and January 1, 4713 B.C. Here's a function that calculates the Julian number of any date and converts a Julian number into a date.

```
FUNCTION Julian
PARAMETERS date_num
DO CASE
CASE TYPE("date_num") = "D"
RETURN date_num - {01/01/0100} +
  1757585
CASE TYPE("date_num") = "N"
RETURN {01/01/0100} +
  (INT(date_num) - 1757585)
ENDCASE
RETURN -1
```

dBASE IV dates start at January 1, 100—Julian day 1757585. If the Julian function receives a date as its parameter, it calculates the number of days between the date and dBASE IV's earliest date, then adds 1757585 to obtain the Julian number. If the parameter is a number, the

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Introducing WinStorm; the only display adapter that can transform your PC into an exciting, high-performance, multimedia machine. It's a single-slot solution with a SCSI CD-ROM interface that lets you experience the full impact of 24-bit, photorealistic color and 16-bit, CD-quality sound. Other so-called "multimedia" cards don't even offer video capability. ■ WinStorm also has interfaces for a standard IBM® joystick, full duplex MIDI, and a 20-voice stereo synthesizer. ■ And it's fully compatible with all popular sound standards, including Sound Blaster, AdLib, Pro AudioSpectrum 16, Thunder Board and MPC. ■ For more information on WinStorm, call: **1-800-843-8086, x251**

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Circle 136 on reader service card.

Even a *free* memory manager may not be a bargain—especially if it can't give you all the memory you need.

Introducing QEMM 7 The Memory Manager Worth Paying For

The newest version of QEMM, version 7, pioneers new ways of using the critical area between 640K and 1024K. It optimizes this area, taking into account the many drivers that need more memory at start-up than when running; instantly calculating millions of possible memory configurations to find still more memory for your applications, TSRs and utilities to use.

Instant Riches

What does more memory mean in a practical sense? Simply that your DOS and MS Windows programs run faster, smoother and more reliably. It means you can continue to add valuable utilities, drivers, TSRs and new capabilities to your PC. Whether it's workhorse drivers like LAN utilities and fax drivers; productivity-enhancers like disk caches and disk compressors; or fun and exciting capabilities like sound boards, CD ROM drivers, graphics tablets, etc. The better your memory is managed, the more versatility and flexibility your PC will have. QEMM 7 lets you have it all without fear of 'out of memory' messages or crashes.

DOS 6 Giveth; DOS 6 Taketh Away

The best feature of new DOS 6 is the stable of utilities it includes. Trouble is, they all eat up memory. Double-Space file compression needs 43K, VSafe anti-virus needs 7-45K, Smartdrv disk cache needs 28K and even Undelete takes 10-14K as a resident program. Using MemMaker, you could easily lose—not gain—available 'conventional' memory in DOS 6.

New QEMM 7 takes the best of the new

How to Look a Gift Horse in the Mouth

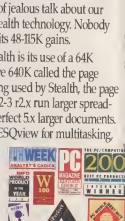
We tested DOS 6 with and without MemMaker and with QEMM 6 and our new QEMM 7 runs away from all of them. See details of test conditions listed below.

DOS 6 features into account, finding ways to cut memory demands for these utilities by up to 80%, ensuring that the all-important memory below 640K is free for your programs. And QEMM 7's seemingly small feature of supporting DOS 6's multiple configurations gives you the flexibility and ease of setup that you expect. (MemMaker doesn't work well with this important DOS 6 feature.)

Page Frame: the Key to Your Future

There's been a lot of jealous talk about our patent-pending Stealth technology. Nobody else can duplicate its 48-115K gains.

The key to Stealth is its use of a 64K reserved area above 640K called the page frame. Besides being used by Stealth, the page frame lets Lotus 1-2-3 r2.x run larger spreadsheets and WordPerfect 5.x larger documents. It's also used by DESQview for multitasking, Novell Netware, IBM LAN Server and DECnet for reducing the network driver memory footprint, plus games for fast action. You sacrifice all this when other memory managers turn off the page frame.



Prior versions of QEMM won just about every competition in sight, as well as remaining the #1 best-selling memory manager 5 years straight.

Stealth saves you room to set up your PC with a mouse, CD ROM, sound board, a network such as Novell NetWare, create 8-24K of extra memory for optimal MS Windows performance, use all of DOS 6's memory-hungry utilities and still have more than 630K to run applications smoothly and safely.

Put Your Money on a Winner QEMM 7

The new and ever more exciting capabilities coming to your PC will all compete for memory with your favorite applications, TSRs and drivers. And that makes QEMM 7 the most vital utility you can own.

Our seventh-generation memory manager is a thoroughbred that helps you get the most out of your PC today and tomorrow.

Quarterdeck

Quarterdeck Office Systems, 150 Pico Boulevard, Santa Monica, CA 90405 (310) 392-9851 Fax (310) 314-4219
Quarterdeck International Ltd., B.I.M. House, Crofton Terrace, Dun Laoghaire Co. Dublin, Ireland Tel. (353) (1) 284-1444 Fax: (353) (1) 284-4380

How we got the chart numbers. CPU—486/33 ALR Power/business VESA machine equipped with 16 megs of RAM and running MS DOS 6. Comparisons were done using the following memory managers: QEMM 7, QEMM 6.02, MS-DOS 6 MemMaker. In addition to the driver list (lowest) required by each memory manager, the following drivers, DOS resources and programs were loaded for all comparisons: on the CONFIG.SYS file: NETWORK.EXE, DOS=HIGH, FILES=20, BUFFERS=18, STACKS=9,256, WINDOWS=SYS, SNOBILL2.SYS, SLCD.SYS, DOS=SHELL=statement, in the AUTOEXEC.BAT file: VSAFE, MSCDEX, UNDELETE, LSL.COM, NBDMI.COM, IPXODI.COM, NETX.COR EMMNETX, MOUSE.COM, SMARTDRV.COM, PRTSC.COM. COM ©1993 Quarterdeck. Other systems. Trademarks are property of their respective owners.

Circle 174 on reader service card.

function generates a date by subtracting 1757585 from the number, and adding the result to 01/01/100. A value of –1 is returned if an invalid parameter is entered.

Once you have created the function, just type ?JULIAN(DATE()) at a dot prompt to see the current day's Julian number. And if you want to find out what date corresponds to Julian number 2,500,000, type ?JULIAN(2500000) at a prompt.

ROGER W. SAUER
FAIRFIELD, CALIFORNIA

PARADOX FOR WINDOWS

PRINT TABLE STRUCTURES

It's easy to view a Paradox table's structure onscreen—just choose File, Utilities, Info Structure. However, it's not immediately apparent how to print this table structure because Paradox doesn't provide a print option in the Structure dialog box.

When you view a table structure this way, Paradox creates a table called STRUCT.DB in the PRIV subdirectory. To print it, open this table and choose File, Print or press Shift-F7 to create a Quick Report and then print it.

WILLIAM BEEM
ORLANDO, FLORIDA

LOTUS 1-2-3

CONVERTING TO HOURS, MINUTES

Converting base-ten numbers to hours and minutes can be a tedious nightmare. The following formula converts a number such as 8.75 into hours and minutes, in this case 8 hours and 45 minutes:

```
@string(@int(a1),0)&" hours
  "&@string(@mod(a1,1)*60,0)&"
  minutes"
```

SHANE DEVENSHIRE
WALNUT CREEK, CALIFORNIA

EXCEL

AUTO DATA LABELS FOR CHARTS

Charts display information graphically but don't necessarily call out the actual numbers of the data. Instead of flipping back to the original spreadsheet, why not include the values of data points on the chart?

This macro automatically adds data labels to all types of charts except surface charts. If you want to create the macro, select File, New and click on Macro Sheet. Add these functions to cells A1..A20:

```
A
1 Points
2 =Echo()
3 =ERROR(0)
4 =GET.DOCUMENT(9)
5 =SET.NAME("type",5)
6 =IF(OR(A4=11,A4=10,A4<7))
7 =SET.NAME("type",4)
8 =END.IF()
9 =SET.NAME("n",16385) and
  =SET.NAME("M",16385)
10=FOR("series",1,n,1)
11=FOR("point",1,m,1)
12=ATTACH.TEXT(type,series,point)
13=IF(AND(ISERR(A12),m<16385)
14=HALT()
15=ELSE.IF(A12=FALSE)
16=SET.NAME("m",point-1)
17=END.IF()
18=NEXT()
19=NEXT()
20=RETURN()
```

Highlight cell A1 and then select Formula, Define Name. Excel puts the word *Points* in the dialog box; click on OK to give the macro this name. Save and close the macro sheet, then reopen it. Open the spreadsheet and enter the name of the chart that you want to label. Select Macro, Run and choose Points from the list in the dialog box.

SHANE DEVENSHIRE
WALNUT CREEK, CALIFORNIA

QUICK TREND LINES

When you need to draw trend lines in Excel, don't knock yourself out trying to master the complicated Trend and Linest (line estimate) functions or the analysis tool for linear regressions. Instead, use this quick technique to draw an accurate trend line.

Highlight the data points you'll graph. Select Data, Sort and click on Descending Order. While the cells are highlighted, place the cursor over the auto-fill handle in the lower right corner. When the cursor becomes a cross hair, hold down the left-mouse button, drag the highlight down several cells, and release it. For example,

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Circle 179 on reader service card.

if you have data in cells A1..A10, highlight these numbers to auto-fill cells A11..A15 with a best-fit series for the numbers in A1..A10.

Copy the auto-filled cells one column to the right, highlight the copied data, and, again, place the cursor over the auto-fill handle in the lower right corner. This time, drag the cursor up to auto-fill the rows to the right of the original data. Excel now has a complete series based on the original data.

If you now chart the original data and B1..B10, the line for the series in column A shows the original data points, and the line for the series in column B shows the trend.

SHANE DEVENSHIRE
WALNUT CREEK, CALIFORNIA

SMART MOUSE TRICKS

Instead of using Ctrl–down arrow to move to the end of a column, simply double-click on the cell border in the direction you wish to move. For example, suppose you are in cell A1, and the column A1..A10 contains data. Just double-click on the bottom border of cell A1, and you'll move to cell A10. If Excel comes across a blank cell, it stops short of the last cell in the series.

You can also use these techniques to select ranges by holding down the Shift key at the same time that you double-click on the cursor borders. For example, to select data in the range A1..M50, place your cursor in cell A1, then hold Shift and double-click on the bottom border of cell A1. The highlight will spread to cell A50. Continue to hold the Shift key and double-click on the right border of cell A50 to select the range A1..M50.

SHANE DEVENSHIRE
WALNUT CREEK, CALIFORNIA

QUATTRO PRO FOR WINDOWS

EDIT RANGE NAMES EASILY

Formulas are easier to read when they use named cells and ranges rather than cell references—but when you use F2 to edit a formula, Quattro Pro changes all range names to cell references. Instead, use a macro to edit formulas and preserve range names.

To create it, enter these labels in a blank area of your spreadsheet:

```
  A    B
1 temp
2 \e     {CONTENTS temp, @CELL
         POINTER("address"),
         240,117}
3        {LET@CELLPOINTER
         ("address"),@TRIM(temp)}
4        {EDIT}{HOME}{DEL}{END}
```

Select cells A1 and A2, and choose Block, Names, Labels. Ensure that Direction: Right is selected, and click on OK. To edit a formula with range names, select its cell and press Ctrl-E.

DANIEL GASTEIGER
CAMBRIDGE, MASSACHUSSETTS

Do you know a better, faster, easier, or more effective way to use software? Share it with others, and we'll send you $50 if we publish your secret. Send your tips, along with your name, address, and daytime phone number, to Software Secrets, *PC/Computing*, 950 Tower Lane, 19th Floor, Foster City, CA 94404.

Step by Step: Lotus 1-2-3 for DOS

MENU MACRO QUICKLY SELECTS FILES

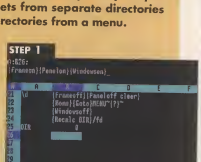
Don't get tangled in finger-twisting directory paths every time you open a file. To retrieve Lotus 1-2-3 spreadsheets from separate directories quickly, use a macro that lets you pick directories from a menu.

Step 1. Enter the macro code.
Start creating the macro by entering @CELLPOINTER("contents") in cell B25. Place the remainder of the macro in cells A21..B27:

```
     A    B
21   '\d  {Frameoff}{Paneloff clear}
22        {Home}{Goto}MENU~{?}~
23        {Windowsoff}
24        {Recalc DIR}/fd
25   DIR  @CELLPOINTER("contents")
26        {Frameon}{Panelon}{Window
          son}
27        ~/fob{NAME}
```

STEP 1

STEP 2



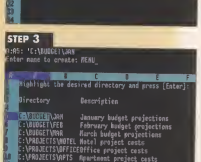
Step 2. Assign the macro names.
Select Range, Name, Labels, Right, and highlight cells A21..A25 to assign the name \d to cell A21 and DIR to cell A25.

Step 3. Create the menu.
Create your menu in cells A1..C20. Use cells A5..A20 for the full nomes of subdirectories and floppies.

To complete the menu, highlight cell A5 and select Range, Name, Create. Type MENU at the prompt, and press Enter to nome the cell. Save the worksheet as AUTO123.WK3 so that 1-2-3 will load the worksheet with the macro at startup. To use the macro, press Alt-D, then select the appropriote worksheet subdirectory from the menu. Press Enter to switch to thot subdirectory ond choose o file to retrieve.

CHRIS SANDLUND
ASSISTANT EDITOR

STEP 3



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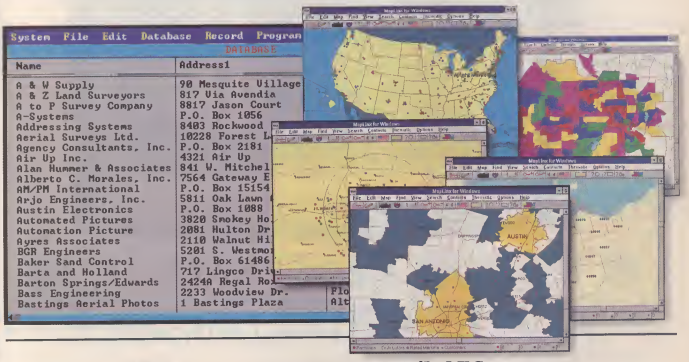
THIS IS YOUR DATABASE ON MAPLINX.



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MapLinx is also a great tool for referring callers to their nearest dealer, service center, doctor or agent – depending on your business. It's perfect for planning service routes, analyzing store locations and much, much more. If you have a database, you *need* MapLinx!

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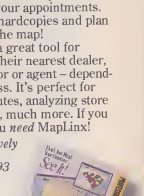

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AT 9 A.M. HE DIDN'T KNOW HOW TO WORK WITH A DATABASE.

When Don Glor came to work on the morning of September 15* he'd never used a database before. Two hours later he'd developed his first application — it looks like a fire truck, actually its a customized inventory and billing management system for the South County Fire Department, San Mateo County, CA.

Don was using Lotus® Approach™—the only database designed for fire fighters. And lawyers and doctors and business people. And anyone who isn't necessarily a computer expert.

Approach lets you get to work right away in familiar, easy to understand desktop items. You can generate reports, forms or form letters — you can even print mailing labels to match any specification.

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This will surprise anyone who has tried to work with databases like Paradox® or Access®. According to Don, "I tried Access and shelved it. It was just too difficult to get a handle on." That's not surprising considering the 543 page supplemental language reference for programmers Don would've had to pore through. Which looks like light reading next to Paradox's 1300 pages of programming instruction.

The difference is that their products were not designed for general business users.

With Approach you have database power that really is accessible, and you work in one of four familiar, desktop items — reports, forms, mailing labels or form letters — that look and work just like you expect them to, to help you be productive right out of the box.

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AT 11 A.M. HE WASN'T SURE HOW HE'D EVER WORKED WITHOUT ONE.

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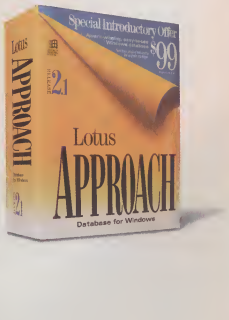

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*1992 Using Release 2.0 "Market Probe International, New York, NY, February 1993 **PC Week Labs 11/2/92 ***Requires MicroDecisionware Gateway **PC/Computing August 1993 ****Plus shipping and handling if applicable. Offer good through 12/31/93 ©1993 Lotus Development Corporation, 55 Cambridge Parkway, Cambridge MA 02142. Lotus and Working Together are registered trademarks of Lotus Development Corporation. Approach and PowerKey are trademarks of Approach Software Corporation, a wholly-owned subsidiary of Lotus Development Corporation. Microsoft Access and FoxPro are registered trademarks and Windows is a trademark of Microsoft Corporation. Paradox and dBASE are registered trademarks of Borland International Inc. Oracle is a registered trademark of Oracle Corporation. DB2 is a registered trademark of International Business Machines Corporation. In Canada call **1-800-GO-LOTUS**.

Write-Once CD Drives

WRITE-CAPABLE CD DRIVES HAVE ARRIVED, BUT WHAT MAKES THEM TICK?

BY RON WHITE • ILLUSTRATION BY TIMOTHY EDWARD DOWNS

Until recently, most people used compact disc (CD) drives for playback only—generally of software provided by a third party. Now, write-once, read-many (WORM) CD drives are emerging as end-user tools for storing large graphics and sound files and publishing limited-run CDs. Your system can read CDs recorded on WORM drives as often as you like, but WORM drives let you record to each CD only once.

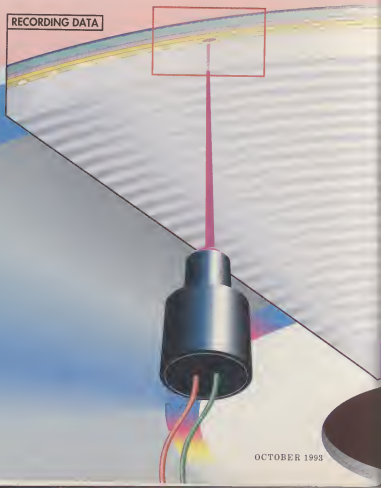
WORM drives read and write using one laser beam with variable intensity: At a low intensity, the beam reads previously recorded data, and at a high intensity—about ten times stronger—it records data. That's the fundamental difference between WORM and read-only CD drives.

The Compact Disc

On the underside of the disc is a clear plastic polycarbonate layer. Just above it, there's a special dye layer, which is the crucial component for both writing and reading data. Next, a thin gold layer reflects the laser beam. Above the gold is a protective lacquer, and on top of that there's sometimes a layer of scratch-resistant polymer. The top layer is the disc's printed label.

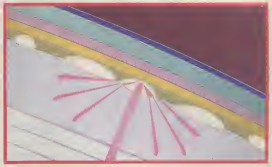
Head Positioning

So that the area of a CD beneath the drive head always moves at the same rate, the drive spins the CD faster as the head moves toward the center. To do this, a CD drive's laser head follows a spiral groove cut into the plastic layer, which contains a wave pattern. This wave varies continuously from the groove's beginning to its end. The laser beam reflects off the wave pattern; by determining the wave frequency, the drive calculates the location of the head on the disc to calibrate the speed of the motor spinning the CD.



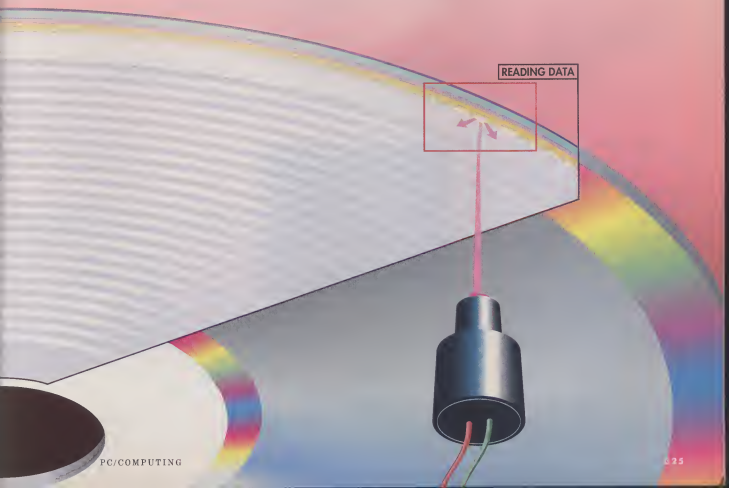
Recording Data

During recording, the CD's software switches the laser beam on and off at high power. When it's on, its energy is absorbed by the disc's dye layer. When the dye layer heats up, the dye is bleached and the layer blisters and bubbles. This leaves a permanent mark called a *stripe*. When the beam is switched off, no mark appears. The lengths of the stripes vary, as do the unmarked spaces between them. The CD drive uses the varying lengths to codify the recorded information, storing it in compressed form along with an error-checking code. Because the interaction at the dye layer is permanent, data can't be erased or modified once it has been recorded.



Reading Data

When a CD drive reads data from a disc, it focuses its laser beam at low power on the CD's groove. Wherever a bleached, bubbled mark is not recorded, the dye layer refracts the laser at an angle such that the gold layer reflects the beam to the read head. Where the dye is bleached and blistered, it refracts the beam at a different angle, causing the light to bounce off the gold layer and miss the read head. This enables the read head to detect the pattern of blister stripes in the groove. The drive decompresses this pattern, error-checks it, and passes it to the computer in the form of digital information—a series of 0s and 1s.



PC/Contact

This Month's Free Software and Shareware All the public-domain and shareware programs, batch files, and utilities featured in *PC/Computing* each month are available on our online service, PC/Contact, or on disk from Public Brand Software for a fee. Shareware requires additional payment to authors for continued use. Here's a sampling of the programs you'll find this month.

Mega Edit .....Windows, page 304
Want the ability to edit large text files? Want to export a file in Macintosh and Unix text formats? How about a split-screen view? Mega Edit is our idea of a real Windows text editor. Download MEGEDT.ZIP from data library 3 (Utilities/Misc.).

Plug-In for Program Manager.....Q&A, page 328
Plug-In adds a wealth of features to Program Manager: custom cursors, special icons for groups, an enhanced File Run dialog box with a command history, and more. Download PLUGIN.ZIP from data library 3 (Utilities/Misc.).

TOP PICKS ON DISK

You can easily get all the public-domain utilities or shareware covered in this month's issue of *PC/Computing* by calling the disk vendor Public Brand Software at (800) 426-3475 or (317) 856-7571. Just ask for this month's Editors' Picks from *PC/Computing*. They're available for $5 or less per disk (most disks have several utilities and programs on them), plus $5 for shipping and handling. Visa and MasterCard are accepted.

HOW TO JOIN PC/CONTACT

For current CompuServe or ZiffNet subscribers, just type GO PCCONTACT to access the forum. Cost is based on CIS's fee of $12.80 per hour for 1,200/2,400 bps and $22.80 per hour for 9,600 bps. There is an additional $2.50 ZiffNet membership charge per month for all users, which includes a number of services. For complete information, type GO ZNI:RATES when online.

For new subscribers, follow these steps:

1. Set the following parameters within your communications program: 7 data bits, even parity, 1 stop bit, and full duplex.
2. Call CompuServe's toll-free customer assistance line at (800) 848-8990 (United States) or (800) 635-6225 (Canada); this call is quick and free. From other countries, dial CompuServe direct at (614) 457-8650. A voice-response system will ask you if you want a local-access number. Then you''ll be asked to enter your phone number and the speed at which you want to access the system. CompuServe reads back the local number you'll use to access the service.

   Or call CompuServe with your modem. Set up your modem and telecommunications package using 7 data bits, even parity, 1 stop bit, and full duplex, and call (800) 346-3247. When the modem connects, press Enter. When you see the HOST NAME prompt, type in PHONES and then hit Enter. Follow the onscreen menus and note the access phone number for your area.
3. Dial the local-access number with a modem. When you connect to the network, press Ctrl-C.
4. At the HOST NAME prompt, type CIS.
5. At the USER ID prompt, enter 177000,5300.
6. At the PASSWORD prompt, enter PC/CONTACT.
7. At the ENTER AGREEMENT NUMBER prompt, type 210DPCC1.
8. If you have trouble, call customer assistance at (800) 848-8990. After you follow the above procedures, CIS will provide you with a user ID—called a PPN—and a temporary password. You can then log on to PC/Contact. You'll receive a letter confirming your PPN and providing you with a new password. Change your password by typing GO PASSWORD at any CIS prompt.

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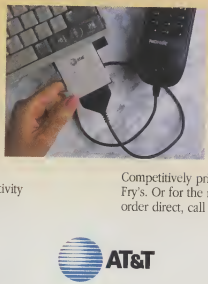

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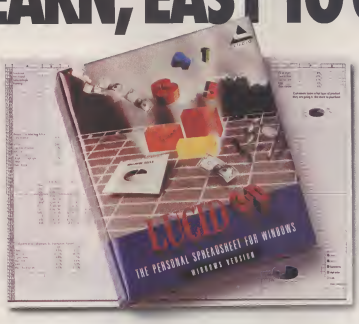

Learning to use a spreadsheet can be a real pain. Especially when you're busy running a business. That's why we created Lucid 3-D for Windows: the fast, powerful and *easy* way to help you track your finances and make better, more accurate decisions.

Its ready-to-use templates – income statements, cash flow projections, balance sheets, expense reports and dozens more – make it easy to start using Lucid 3-D for Windows right out of the box. Button bars give you instant access to frequently used features. And online, context-sensitive help guides you through any task.

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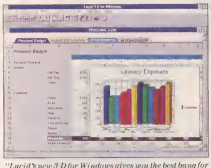

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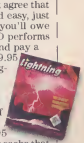
Leo Laporte, Host "On Computers"

Try it FREE

Try Lucid 3-D free for 30 days. Simply pay the $9.75 shipping & handling charge with a major credit card. If you don't agree that Lucid 3-D is fast, powerful and easy, just return it within 30 days and you'll owe nothing more. But if Lucid 3-D performs like we say it will, keep it – and pay a limited-time price of only $69.95 (that's half the $129.95 suggested retail price).



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Circle 235 on reader service card.

CRACK YOUR PC RIDDLES WITH HELP FROM PC/C'S ANSWER GUYS. BY DALE LEWALLEN AND JEFF PROSISE

Cache Surplus

My new 486 has a built-in 8K CPU cache, its motherboard has an additional 128K cache, and the hard drive is attached to a 256K caching controller. I also have Norton Utilities and Norton Desktop for DOS, each of which comes with a disk-caching program (so do PC Tools and Windows 3.1).

Can you explain the differences between all these caches? If I use one, should I forgo the others? Which one should I use?

DONALD ADAMS
BEVERLY, MASSACHUSETTS

You're talking about three different kinds of caches. First, there is the static CPU RAM cache. That type includes the 8K cache built into your system's CPU and the 128K external cache on your system board. These caches slavishly serve just one purpose: to increase the speed at which data travels between RAM and the CPU by reducing the number of memory accesses. Static RAM (SRAM) is much faster than the dynamic RAM (DRAM) that makes up a typical memory subsystem. As a general rule of thumb, the bigger the static RAM cache, the better the CPU's performance.

The RAM cache built into your hard disk controller is a different type of cache. It buffers data between RAM and your hard disk. A caching controller can dramatically improve drive performance by reducing the number of physical disk accesses required. Even a fast hard disk is slow compared to the system surrounding it, so reducing the time your system spends reading and writing disk data is an excellent way to boost performance.

The caching utilities that come with Norton Utilities, PC Tools, and Windows constitute a third kind of cache. These utilities speed performance by using part of your PC's RAM to cache hard disk data. The effect is similar to that of a caching controller, but you have more control over the way caching is performed. For example, you usually choose the cache size yourself. Most caching utilities also permit you to cache selected drives, and many cache floppy disk and CD-ROM data as well as hard disk data. All of the caching utilities that you mentioned are good ones, and they work with all types of software.

Your 486 system benefits from all three forms of caching. For optimal performance, let the static RAM caches continue caching data for the CPU and let the caching controller continue caching disk data. Then use a caching utility—such as Norton, PC Tools, or SmartDrive—to help the disk controller cache disk data. For best results, allocate 1MB to 2MB of memory for the disk-caching utility. In certain cases, a disk-caching utility that is allocated no more RAM than the size of the RAM buffer on the caching controller (256K in your case) can impede disk performance. Current disk-caching utilities are designed so that the more RAM you allocate for a disk cache, the greater the performance gain.

Permanent ATM

I can't get rid of Adobe Type Manager! I acquired the ATM icon when it was installed by an application it was bundled with. Though I've disabled ATM, I can't get rid of its icon. I dearly would like to see the last of the ATM icon but I can't figure out how to make it go away.

RONALD L. BEAHM
SARASOTA, FLORIDA

The information you need to remove ATM from your system is included with Adobe's ATM documentation,

/// Help About... ///////////

DRAG-AND-DROP DELETION IN FILE MANAGER

PCContact

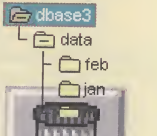
I'VE SEEN SHAREWARE PROGRAMS THAT ADD A MACINTOSH-LIKE GARBAGE CAN TO WINDOWS. THEY LET YOU DELETE FILES BY DRAGGING THEM FROM FILE MANAGER AND DROPPING THEM INTO THE TRASH. BUT MOST OF THESE UTILITIES HAVE MORE BELLS AND WHISTLES THAN I NEED. IS THERE AN INEXPENSIVE DRAG-AND-DROP WINDOWS UTILITY THAT JUST DELETES FILES?

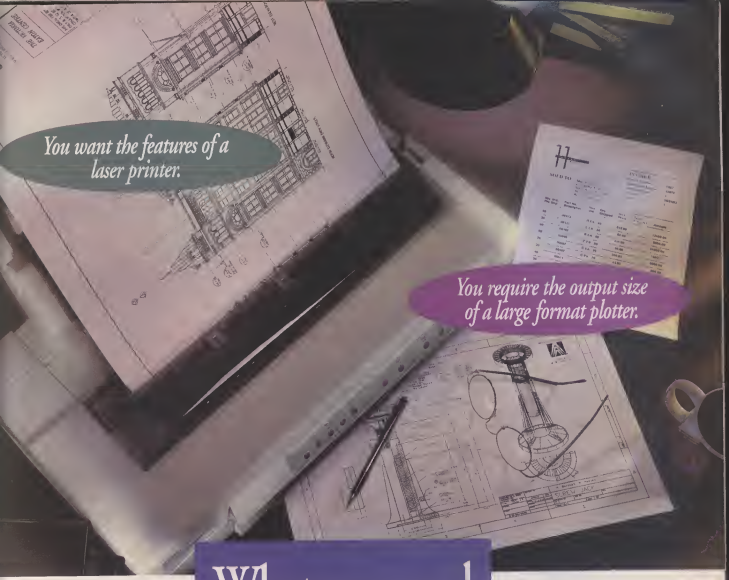
JON GAGE
STOWE, VERMONT

We liked your idea, so we developed our own drag-and-drop Windows file eraser called Drop Delete and made it available on PC/Contact, PC/Computing's online service. Look for DRPDEL.ZIP in data library 3 (Utilities/Misc.).

Add Drop Delete to the Windows Startup group to load it every time you start Windows. Just drag the files you want to delete from File Manager over to the garbage-can icon at the bottom of the screen.

Drop Delete differs from some similar programs in that files are deleted as soon as they're dropped into the garbage can—there's no Empty Trash command as with the Macintosh, nor is there a built-in way to recover a deleted file. If you delete a file by mistake and you're using DOS 5.0 or 6.0, you may be able to undelete it using DOS's UNDELETE command or the Windows Undelete utility shipped with DOS 6.0. If you have a third-party file-recovery program like those in Central Point's PC Tools for Windows or Symantec's Norton Desktop for Windows, you can still recover any file you drop into the trash.





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PACIFIC DATA PRODUCTS

which may not have come with your bundled version of the program. So, here's a quick recap.

First, make a backup copy of your SYSTEM.INI file. Then use the Windows Sysedit program (or any ASCII editor) to open SYSTEM.INI, and look for these two lines:

```
SYSTEM.DRV=ATMSYS.DRV
ATM.SYSTEM.DRV=SYSTEM.DRV
```

Next, replace the pair with the following single line:

```
SYSTEM.DRV=SYSTEM.DRV
```

Save your changes, exit from Sysedit, and then exit from Windows. From the DOS prompt, delete the following files from your \WINDOWS\SYSTEM directory: ATM.DLL, ATM16.DLL, ATM32.DLL, and ATMSYS.DLL. You might not have all of these files, depending on your version of ATM. Next, delete ATM.INI and ATMCNTRL.EXE from the \WINDOWS directory. Your ATM icon will be gone when you restart Windows.

After you have removed the ATM program from your system, you will still have any Type 1 PostScript outlines that you previously installed. To remove them, change to the directory containing PostScript fonts, and delete all files that have .PFM and .PFB extensions.

Icon Variety

My Windows desktop contains 14 program groups that use the same pathetic icon. Thanks to the icon editor in Central Point's PC Tools for Windows, however, I have edited the default group icon for PROGMAN.EXE. But what I really want to do is assign a different icon for each program group. How can I do this?

PETER PORTEOUS
NEPEAN, ONTARIO

Windows 3.1 permits you to change icons only for executable program items. Even if you modify the default group icon in Program Manager's executable file, you'll still get the same icon each time you create a new group. However, PC Tools for Windows lets you change the executable-program icon, program-group icons, and icons on the PC Tools desktop.

First, click on an icon with the right-mouse button for a menu of properties that you can change. Click on the Icon menu item to browse for icons that are stored in other programs' executable files and dynamic link libraries and in Central Point's icon libraries. In the \PCTW\DATA subdirectory, you'll find five icon libraries containing a total of more than 500 icons. For a bank of 106 more icons, check out the file MORICONS.DLL, which you'll find in your \WINDOWS subdirectory. Once you've picked the icon you want, just click on OK.

If you don't have PC Tools for Windows, get hold of the shareware program Plug-In for Program Manager. It lets you change Program Manager group icons and provides a wealth of other enhancements. You can download PLUGIN.ZIP from PC/Contact's data library 3 (Utilities/Misc.). See page 326 for information on using PC/Contact.

Challenge

I OFTEN WRITE EXTREMELY CONFIDENTIAL LETTERS ON MY COMPUTER. LATER, I PERMANENTLY ERASE EACH FILE AS WELL AS ITS BACKUP USING NORTON'S WIPEINFO.EXE. UNFORTUNATELY, FRAGMENTS OF THESE LETTERS, OFTEN CONTAINING SIGNIFICANT AMOUNTS OF CONFIDENTIAL INFORMATION, CAN BE FOUND IN THE WINDOWS PERMANENT SWAP FILE, 386SPART.PAR. HOW DO I GET RID OF THESE CONFIDENTIAL FRAGMENTS WITHOUT CORRUPTING THE SWAP FILE OR COMPROMISING SECURITY?

RICHARD M. GOSHEY
HIGHLAND PARK, NEW JERSEY

We suspect Ollie Narth wauld have liked the answer to this question, toa. It's a bit mare camplicated than it might first appear. Your challenge is ta help ensure that Richard M. Gashey's canfidential files stay canfidential in a Windaws envirnament.

Ta win, yau'll need ta explain the issues invalved and the reasan Mr. Gashey can't secure his files just by maving them to flappy disks. If you think you're up ta the Challenge, drap us a letter marked "Ostober Challenge." If we publish your salutian, we'll canvey aur thonks with $50.

JUNE CHALLENGE SOLVED

We challenged yau ta came up with as many ways as you could think of ta transfer data ta and from Macintash systems. Our winner, David Hull of Tarrance, Califarnia, sent in so many gaad suggestions that we don't have space ta list them all, but here are the best af the bunch:

- Use application software that is file-farmat compatible an bath platforms. Such programs include Latus 1-2-3, Micrasaft Ward and Excel, WardPerfect, Aldus PageMaker, Framemaker, and QuarkXpress.
- Ta transfer files via flappy disk, use Macintash's SuperDrive plus the Mac System's Apple File Exchange utility ta maunt the flappy disk. A SuperDrive can read, write, and farmat bath IBM and Mac farmats.
- Ta transfer ASCII data files, cannect the twa systems with a null madem coble and use standard cammunications pragrams an bath the Mac and the PC.
- If yaur Mac and PC programs are incampatible, purchase translation software.
- Ta transfer mare than 1MB ar 2MB af data, try lamega's Bernaulli drive technalagy, which warks an bath Mac and PC systems and lets you transfer up ta 150MB af data per cartridge. You'll find flappy disks just toa cumbersame far transferring this much data.
- Ta transfer data between Macs and PCs an a regular basis, add a Mac-campatible LAN ta yaur PCs. Artisaft's LANtastic, far example, lets yau cannect yaur Macintash systems ta a PC-based network.
- Finally, when you just want ta send a small file ta a calleague, use a public data network like CompuServe ar MCI Mail. As long as the recipient hos software that can read the file, he or she can immediately open it and get to wark.

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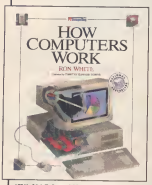
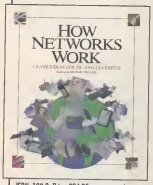


ISBN: 094-7 Price: $22.95

PC/Computing How Computers Work

A worldwide blockbuster that hit the general trade bestseller lists! *PC/Computing* magazine executive editor Ron White dismantles the PC and reveals what really makes it tick.



ISBN: 129-3 Price: $24.95

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Two of the most respected names in connectivity showcase the PC network, illustrating and explaining how each component does its magic and how they all fit together.

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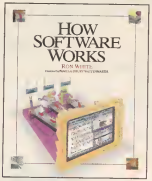

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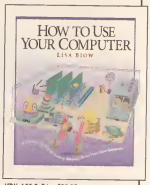
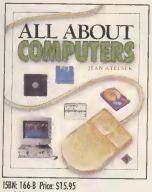


ISBN: 155-2 Price: $19.95



ISBN: 166-8 Price: $15.95
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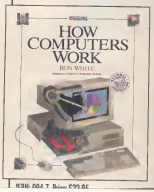

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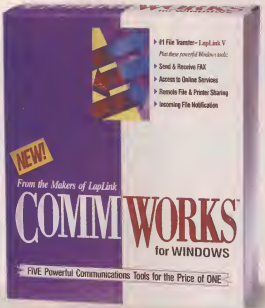

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Can't Create a PRN Directory

While creating a system of subdirectories on my hard disk, I learned that DOS won't let me create a subdirectory named PRN. When I tried, I received the error message "Unable to create directory," with no explanation.

Why can't I name a subdirectory PRN? Is it possible that there's a bug in the MD command?

H. RHEA CHAFIN
GUATEMALA CITY, GUATEMALA

You can't create a subdirectory named PRN (or a file named PRN) because PRN is a reserved name in DOS. Specifically, it is the name that DOS assigns to the printer device it loads each time it starts up. How is PRN used? To find out, use the following command to print a directory listing:

```
DIR > PRN
```

DIR produces the directory listing, and > PRN redirects output from the DIR command to the PRN device (by default, the printer that's connected to LPT1). DOS prohibits files or subdirectories from having the same names as its internal devices in order to avoid conflicts. If PRN referred to both a file and a device, DOS wouldn't be able to distinguish between the file you named PRN and the devices.

Troublesome DMA

While using Fastback Plus to back up my hard disk, I received the error message "Fatal error during DMA test. Unable to complete test." I also received the message "DMA controller channel not ready" when I ran a diagnostic program. Strangely, the BIOS diagnostics that came with my PC report that the DMA registers are working properly. How can I resolve my problem?

MARCEL BUCHSBAUM
HEWLETT, NEW YORK

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The problem most likely stems from one of two things: Your PC's DMA controller has gone bad, or you're using a 386 memory manager with too little DMA buffer space reserved. If the problem is the former, you'll need to have a repair technician look at your system board. If it's the latter, you can eliminate the errors by changing a CONFIG.SYS setting.

If the memory manager is DOS's EMM386.EXE, add a D=32 switch to the line that loads it. If that doesn't

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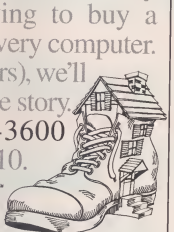

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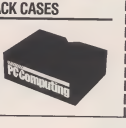

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work, try D=64. If the errors still occur, keep increasing the number in increments of 16 or 32 until you reach the limit of 256. This switch specifies the size in kilobytes of the largest DMA data transfer that will occur while EMM386.EXE is operating. QEMM-386's DMA= switch works in the same way, as does 386Max's DMA= switch. Inadequate DMA buffer space in these virtual-mode memory managers frequently causes DMA transfers to fail. If that's the problem, increasing the allotted DMA buffer space will eliminate the errors.

Short-Term Memory Loss

I have a 486DX/33 system with 8MB of RAM. When my system boots, the screen shows 8,064K instead of 8,192K, which is 128K short of a full 8MB. I know that all of the RAM is physically present, but I am curious to know why my PC doesn't show the full amount at startup.

REX THOMPSON
SAN ANSELMO, CALIFORNIA

Most likely, the missing 128K is being used as shadow RAM. The RAM in most 386 and 486 PCs is much faster than ROM, but your PC spends a significant part of its time executing code in ROM because that's where its BIOS is stored. Your computer's BIOS is a collection of input and output routines that DOS and application programs use to communicate with hardware devices attached to your PC—the keyboard, the video card, the printer, and the disk drives.

The BIOS increases overall performance 5 to 10 percent by copying itself to fast, 32-bit RAM and redirecting memory accesses so that all calls to the ROM BIOS are rerouted to the copy in RAM. The area of memory that stores this copy is commonly referred to as shadow RAM.

Most PCs do not count shadow RAM in their RAM total. Therefore, an 8MB PC with 128K set aside to shadow the ROM BIOS will count only up to 8,064K. Most PCs that support shadow RAM also enable you to disable ROM shadowing through their setup screens. Disabling shadow RAM will recover the missing 128K of RAM, but at a cost: Your PC will run slightly slower.

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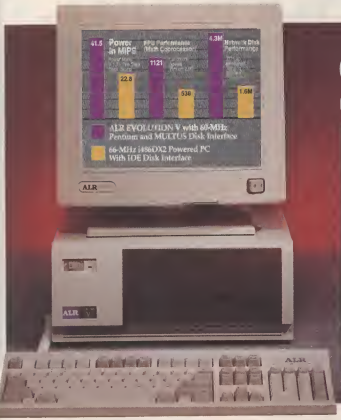

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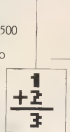

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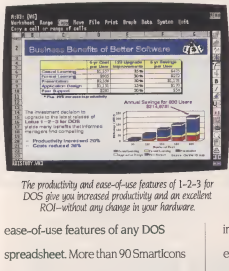

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EXPERT TIPS FOR TAPPING INTO YOUR NETWORK'S STRENGTHS. **BY JOHN TASCHEK**

NETWARE UTILITIES

HOTKEY NETWORK SETTINGS

Want a quick way to change NetWare printers and drive mappings from Windows? The following undocumented tip lets you create a hotkey that calls up a dialog box for changing any drive, printer, or server-attachment setting.

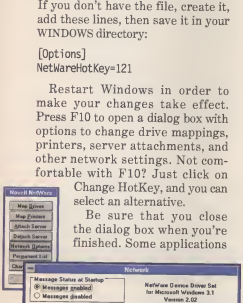
First of all, make sure that Windows is set up for a NetWare network: From within Windows, open Windows Setup in the Main group, and check the line that indicates the network type. If it doesn't specify Novell NetWare, then change the setting so that it does. Make sure that you have the original Windows floppy disks handy.

Open NETWARE.INI in an ASCII text editor such as Windows Notepad. If you don't have the file, create it, add these lines, then save it in your WINDOWS directory:

```
[Options]
NetWareHotKey=121
```

Restart Windows in order to make your changes take effect. Press F10 to open a dialog box with options to change drive mappings, printers, server attachments, and other network settings. Not comfortable with F10? Just click on Change HotKey, and you can select an alternative.

Be sure that you close the dialog box when you're finished. Some applications can't accept keystrokes when this program is running, even if it's running in the background.



Novell's undocumented NetWare hotkey feature opens a dialog box that gives you instant access to your most-used NetWare commands.

NETWARE ADMINISTRATION

AVERT LOG-OUT DISASTERS

Logging out of the network when you're in Windows can cause several significant problems: It crashes any application that is running from a network drive, it makes Windows unstable, and it crashes Windows altogether if you're running it from a network drive. Unfortunately, it's easy for users to log out from Windows inadvertently when they're working in full-screen DOS sessions.

The following program and batch file, however, prevent users from logging out of the network while they're running Windows.

First, use an ASCII text editor (such as DOS's EDIT) to create the following file, and then save it as SAFELOG.SCR:

```
N SAFELOG.COM
E 0100 B8 0A 16 CD 2F 09 C0 75
E 0108 0E 81 F1 03 00 75 04 B0
E 0110 06 EB 46 B0 05 EB 42 B8
E 0118 00 16 CD 2F A8 7F 74 04
E 0120 B0 04 EB 35 B8 80 46 CD
E 0128 2F 09 C0 74 04 B0 00 EB
E 0130 28 B8 02 4B 31 DB 89 DF
E 0138 8E C3 CD 2F 09 C0 75 04
E 0140 B0 01 EB 15 B8 05 16 CD
E 0148 2F 83 F9 FF 75 04 B0 03
E 0150 EB 07 B8 06 16 CD 2F B0
E 0158 02 B4 4C CD 21
RCX
005D
W
Q
```

Next, make sure that DEBUG is on your system's DOS path, and enter the following command to create the file SAFELOG.COM:

```
DEBUG < SAFELOG.SCR
```

SAFELOG.COM's function is to return a DOS errorlevel code based on whether or not the user is running a graphical interface.

Next, create a batch file that interprets the errorlevel codes returned by SAFELOG.COM and prevents users from executing LOGOUT.EXE if Windows is indeed currently running. Use a text editor to create the following file and save it with the name LOGOUT.BAT:

```
@ECHO OFF
SAFELOG
IF ERRORLEVEL 1 GOTO UNSAFE
LOGOFF
GOTO END
:UNSAFE
ECHO Warning! You are running
ECHO Windows.
ECHO Exit Windows before
ECHO attempting to log out.
:END
```

Next, log in as a supervisor, switch to the \SYS:\PUBLIC directory, and rename LOGOUT.EXE as LOGOFF.EXE. Copy LOGOUT.BAT—the batch file you just created—to \SYS:\PUBLIC. When users type LOGOUT, your batch file runs. If it's safe for users to log out, the batch file runs LOGOFF.EXE; otherwise, it issues a warning and prevents users from logging out.

EASIER LOG-INS

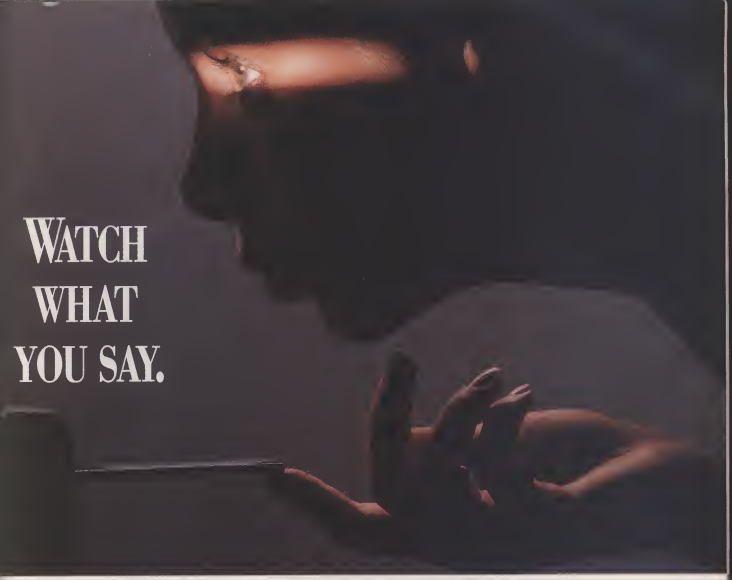
Type an incorrect user name or password when logging in, and you must start the whole process again—unless you use a repeating batch file to restart the process automatically.

Open the batch file that starts your network in an ASCII text editor. Locate the line that begins with LOGIN and add these lines:

```
F:LOGIN
IF EXIST Z:NPRINT.EXE GOTO END
F:LOGIN
IF EXIST Z:NPRINT.EXE GOTO END
F:LOGIN
:END
```

If the LOGIN line is missing, enter the lines after IPX, NETX, and any other programs needed to run your network. If necessary, replace F: with your first network drive.

When the batch file loads, you have three chances to log in to the network without retyping the commands. If you fail three times, the batch file quits and you'll have to start the log-in process again.



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WINDOWS FOR WORKGROUPS

TUNE RESOURCE SHARING

If applications under Windows for Workgroups have slowed to a halt, tune your network settings to reclaim lost resources. On a Windows for Workgroups network, resources such as your hard disk and memory are shared among all users with access to your computer.

Although the default Windows for Workgroups settings are normally fine, performance plummets when heavy network use taxes resources.

Fortunately, Windows for Workgroups features a setting that places a traffic light in front of your personal resources. To pump up your application performance at the expense of network sharing, open Control Panel and double-click on Network. In the Network Settings dialog box, slide the bar under Performance Priority closer to Applications Run Fastest. If you frequently access data or applications on a Windows for Workgroups workstation that's rarely used except as a network resource, open its Network Settings dialog box and slide it toward Resources Shared Fastest. Click on OK, and your changes take effect.

Note: These settings apply only if you are sharing resources. Otherwise, applications should always be set to run fastest.

REV UP NETWORK PRINTING

Background printing is difficult when your workstation is a Windows for Workgroups server. If so, you can speed applications by keeping outside print jobs from usurping resources.

First, set up the Windows for Workgroups print server. Open Print Manager (usually located in the Main group), select Options, Background Printing, and click on Low in order to speed up applications during background printing. You should choose High only if the host PC gets little use.

The server's Print Manager settings apply to all other PCs on the network. Note that these network printing settings don't apply when you're printing directly from the host, which accesses its own local port.

For optimal speed when you're outputting to a network printer, you can bypass Print Manager altogether. If Print Manager is on, Windows for Workgroups spools each print job locally and sends it to the network printer, where it is spooled again. Having all network users set Print Manager to print directly to the network thus saves a step in the printing process.

Do you get the best out of your network without calling tech support? Share your secrets. If we publish your tip, we'll send you $50. Send your tips, along with your name, address, and daytime phone number, to Networking Smarter, *PC/Computing,* 950 Tower Lane, 19th Floor, Foster City, CA 94404.

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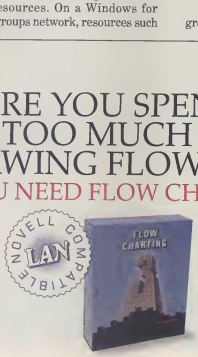

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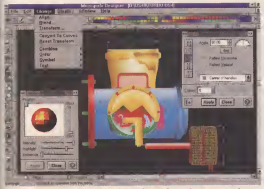

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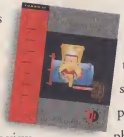

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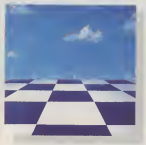

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Incorporating PC Sources

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Inside Spec Watch

You can't buy smart without a scorecard. Learn the vital statistics first to make sure you're not shortchanging yourself.

They don't call it a graphical interface for nothing. Photos, logos, and other graphics now dress up even the most basic Windows documents. What's the easiest way to get graphics into your PC? Use a scanner, of course. With the current appetite for graphics in mind, we've added two products to Spec Watch: flatbed color scanners to bring the graphics into your PC, and IDE hard drives to keep up with graphics files' insatiable appetite for disk space. Other trends to watch:

- **Desktop Systems**
  Pentium-ready systems aren't created equal. When buying a Pentium-upgradable system, make sure that the CPU, secondary cache, and memory come on a processor upgrade card. Otherwise, you won't get full 64-bit Pentium performance when you upgrade.

- **All-in-One Modems**
  The latest wave of modems combines data, voice, and fax. These modems will save you money over the piecemeal approach.

- **Notebook PCs**
  Need color on a tight budget? Dual-scan passive-matrix color is far better than you'd expect—and notebooks with this technology cost only about 20 percent more than passive-matrix monochrome ones.

- **Windows Displays**
  It's easy being green. By year-end, most monitors will wear the EPA's new Energy Star seal. But some green monitors require a green video card to cut energy consumption—and electricity bills. Make sure your video card meets the EPA standard as well.

By Wendy Taylor and Marty Jerome

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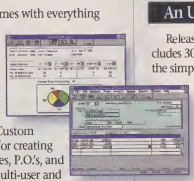

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COREL

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The 230MB IDE Hard-Drive Upgrade Gives Windows the Room It Needs

Security, performance, and price matter most. IDE makes it simple.

Remember when you upgraded to Windows and reckoned that 60MB of hard disk space was all you needed? Today, buying a desktop PC with less than 230MB is nuts. Audio and video files, 24-bit images, and multimedia applications fill hard disks faster than anyone imagined just three years ago.

Remember when naysayers prophesied that IDE technology would never support capacities of 230MB? Fortunately, IDE hard drives have grown in capacity. For very large hard disks—half a gigabyte or more—SCSI still offers several advantages over IDE. And if you plan to run more than two physical drives in your system, SCSI is the only practical choice.

But as a first or second drive in a desktop system, IDE technology can't be beat. Installation takes 30 minutes, and even slim PCs can usually accommodate two hard drives. Make sure the documentation for the second drive shows how to install it to run in conjunction with another drive.

Measuring drive performance is a slippery business. Many manufacturers advertise a drive's *seek time,* the length of time the read/write head takes to reach the track on the hard disk where the requested data is stored. But this is only one component of *access time,* which also includes the time it takes for the read/write head to read the data into the buffer. Look for average access times of 13 milliseconds or less. Also bear in mind that no matter how fast the disk access, a slow transfer rate means slow performance. Look for 4MB per second or faster and at least a 64K buffer.

Forget the drive's mean time between failures, the manufacturer's best guess at how long the drive will chug along until it dies. Instead, look for a two- to three-year warranty. Also, make sure the drive has self-parking heads so that the bumps of life don't hurt your data. Finally, insist on a 30-day money-back guarantee.

Capacity: 230MB or greater.

Performance: 13ms or faster access time, 4 MBps or better transfer rate.

Features and options: Self-parking heads, diagnostic and partitioning software.

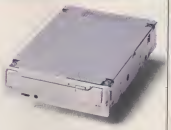
Size: Half height or full height, depending on your system's drive space.

Cache or buffer: 64K to 256K.

Red flags: *Mounting brackets and cables should come with the disk; look for a 30-day full money-back guarantee and a two- or three-year warranty.*

Don't settle for less than these specs:

CD-ROM Drives



Access time: 200ms.

Transfer rate: Dual-speed drive: 150 Kps to 300 Kps.

Ondrive cache: 64K.

Interface: SCSI.

Compatibility: High Sierra (data), CompactDisc (audio), and PhotoCD (still photography) with multisession support (MPC Level II).

Audio: Output jack and volume control.

Packaging: Internal.

Features and options: Bundled CD-ROM discs, single-handed operation.

Other requirements: Disk caddy (if needed).

Red flags: *Avoid proprietary interfaces and drives that aren't MPC or MPC Level II compatible; faster CD XA CD-ROM technology will debut soon.*

Sound Cards

Compatibility: Sound Blaster.

Mode: Stereo.

Card type: Internal.

Sampling capability: 16-bit record and play (MPC Level II standard).

Maximum sampling rate: 44.1kHz.

Synthesizer: Wave or FM with Wave option.

Bundled software: Windows and DOS utilities for playing, recording, and editing digital and MIDI files.

Ports: Speaker, microphone, and joystick.

Features and options: Onboard digital signal processor for compression and processing, SCSI port for a CD-ROM drive.

Red flags: *Avoid cards that play but can't record 16-bit sound; avoid proprietary (non-SCSI) CD-ROM interface.*

Subnotebook PCs

CPU: 20MHz 386.

Display type: 7.5-inch backlit passive- or active-matrix LCD.

Weight: 4 pounds or less.

Size: Under 8½ by 11 inches.

Keyboard: 90 percent of full-size keyboard.

RAM: 4MB expandable to 16MB.

Hard drive: 40MB or larger.

Features and options: Removable hard drive, high-speed internal fax modem, integrated pointing device, infrared keyboard connection.

Other requirements: External floppy, at least 1 Type II PCMCIA slot, small recharger (5½ by 3 by 1½ inches or less).

Red flags: *Subnotebook displays and keyboards entail compromise—try before you buy, or make sure there's a money-back guarantee with no restocking charge.*

Notebook PCs

CPU: 25MHz 486.

Display type: 9½-inch or larger backlit monochrome LCD, dual-scan passive-matrix or active-matrix color preferred.

Weight: Under 6 pounds for mono, under 7 pounds for color; battery charger under 1 pound.

Size: Smaller than 10 by 12 by 2 inches.

RAM: 8MB expandable to 20MB.

Hard drive: 120MB.

Ports/slots: Parallel, 9-pin serial, PS/2 slots; 1 PCMCIA Type III slot or 2 Type II slots.

Features and options: Ability to swap out floppy drive for second battery, removable hard drive, user-installable RAM, integrated pointing device.

Other requirements: Standby mode, pop-up battery gauge, 6-by-3-by-3-inch battery recharger.

Network Servers

CPU: Intel Pentium, 486DX2/66, or 486DX/50.

RAM: 16MB expandable to 64MB.

CPU RAM cache: 256K.

Display: 14-inch Super VGA color or monochrome.

Video card: Super VGA with 512K of RAM.

Hard drive: 1GB SCSI-2.

Drive bays: Two full-height 5¼-inch bays, two half-height 5¼-inch bays with front-panel access, two 3½-inch bays.

Bus: Eight EISA slots, including two VL-Bus slots.

Features and options: RAID-5, DAT backup, uninterruptible power supply.

Other requirements: FCC Class A or better, UL listed.

Red flags: *Avoid ISA bus, slotted RAM, machines without CPU upgrade sockets, 80ns or slower RAM.*

Windows Displays

Size: 17 inches; 20 to 21 inches for graphics applications.

Resolutions: 1,024 by 768; 1,280 by 1,024 for 20- or 21-inch monitors; noninterlaced.

Dot pitch: 0.28mm for 17-inch monitors; 0.31mm for 20-inch.

Vertical refresh rate: 72Hz at all resolutions.

Tube type: Flat-square or Trinitron.

Controls: Front-panel digital image controls.

Features and options: Support for MPR-2 low-emission standards, microprocessor-based controls for image-setting storage, EPA Energy Star compliant.

Other requirements: Adjustable tilt-and-swivel base, video cable, antiglare coating or add-on filter.

Red flags: *Avoid monitors with dot pitch greater than 0.31mm and limited or inaccessible controls.*

Windows Accelerator Cards

Resolutions: 1,024 by 768; 1,280 by 1,024 for 20-inch monitors.

Colors: 256 colors at 1,024-by-768 resolution for business apps; 65,000 colors at 1,024 by 768 for near-photo-quality images.

Accelerator chip: Fixed-function chip such as S3 86C801, IIT AGX014, or ATI 68800 (Mach 32).

Vertical refresh rates: 72Hz at all resolutions.

RAM: 1MB for 256 colors at 1,024 by 768; 2MB or more for higher resolutions and more colors.

Features and options: VL-Bus model option, Windows utility to switch resolutions and colors.

Other requirements: Driver installation software, two-year warranty, Windows 3.1 drivers, free driver updates via BBS, CompuServe, or mail.

Red flags: *Avoid interlacing and boards that support only 70Hz vertical refresh rates.*

24-Bit Color Cards

Resolutions: 1,024 by 768 or higher.

Colors: 16.7 million colors at 1,024-by-768 or 1,152-by-870 resolution.

Graphics processor: For 24-bit Windows applications, a fixed-function processor; for 24-bit DOS apps, a full-fledged graphics coprocessor (TI34020 chip).

Vertical refresh rates: 72Hz at all resolutions.

RAM: 4MB.

Drivers: For Windows 3.1 and your specific DOS apps.

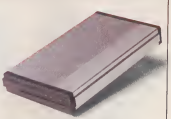
VGA support: Onboard VGA chip.

Features and options: VL-Bus or EISA model option, Windows utility to switch resolutions and colors.

Other requirements: 2-year warranty; free driver updates via CompuServe, BBS, or mail.

Don't settle for less than these specs:

All-in-One Modems



Transmission rate: 14,400 bps without compression, 57,600 bps with compression.

Supported standards: V.32bis (data speed), V.42 (error correction), V.42bis (data compression), CCITT Group 3 Class 1, Class 2, and CAS (fax).

Compatibility: Hayes.

Port selection: COM1 through COM4.

Bundled software: DOS and Windows communications and fax software, OCR software.

Features and options: Integrated voice, data, and fax; onboard digital signal processor and coprocessor; 16550 universal asynchronous receiver/transmitter; LCD display on external modems; upgradability to V.Fast protocol.

Red flags: *Avoid fax modems without fallback transmission-rate capabilities.*

Ethernet Network Adapters

Card type: 16 bit, ability to auto-configure to 8 bit.

Network support: NetWare, LAN Manager, LAN Server, Windows for Workgroups, Windows NT.

Drivers: Eagle NE2000–compatible drivers, support for NDIS and ODI drivers.

Media connectors: For 10Base-5 (Thicknet), 10Base-2 (Thinnet), and 10Base-T (RJ-45); automatic sensing of media configuration.

Installation: Should be software configurable and support interrupt levels above IRQ 7.

Features and options: Upgradable boot PROM; SNMP support; polarity, collision, and link status LEDs; bus-mastering interface.

Other requirements: Diagnostic utilities, slot-bracket-mounted transmission and reception LEDs, 16K or larger buffer.

Desktop Laser Printers

Emulations: PCL 5, PostScript option with automatic emulation switching and all ports active.

Print engine speed: 8 ppm.

Resolution: 600 dpi.

Resident fonts: 45 total; 10 TrueType fonts (matching Windows 3.1).

RAM: At least 2MB.

Interface: Bidirectional parallel.

Paper capacity: 200 sheets.

Footprint: 260 square inches or less.

Features and options: HP-compatible font cartridges and slots, RISC processor for 600-dpi printers.

Other requirements: Toner cartridge, parallel cable.

Red flags: *Toner should be included; avoid proprietary cartridge slots.*

Color Thermal Wax-Transfer Printers

Emulations: PostScript Level 2.

Print speed: 1 ppm.

Resolution: 300 dpi.

Processor: 16MHz RISC.

Printer language: PostScript Level 2.

RAM: 4MB.

Interface: Parallel.

Fonts: 35 Adobe Type 1.

Ribbon: Three-color transfer ribbon.

Features and options: Internal network interfaces, support for 4-color (3 colors plus black) ribbons.

Other requirements: RAM expandable to 8MB, network interfaces.

Red flags: *Be sure vendor provides a PostScript Level 2 driver; despite some claims, business-quality printing on plain copier paper isn't a reality yet.*

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Network Laser Printers

Emulations: PCL 5, PostScript Level 2 with automatic emulation switching.

Print engine speed: 20 ppm.

Resolution: 600 dpi.

Processor: 16MHz RISC.

Resident fonts: 90 total: 10 TrueType (matching Windows 3.1), 45 PCL 5, 35 PostScript.

RAM: 8MB.

Interfaces: Parallel and 10Base-T or 10Base-2 Ethernet, Token-Ring, or LocalTalk.

Network support: Concurrent support of Novell NetWare, Windows NT, Windows for Workgroups, LAN Manager, LAN Server.

Paper capacity: 1,000 sheets.

Warranty: One year with onsite service.

Features and options: SNMP support.

Single-User Tape Drives

Storage capacity: 250MB when compressed.

Packaging: Internal 3½-inch drive preferred; external for PC-to-PC portability.

Interface: Floppy drive, IDE, or SCSI.

Cartridge type: DC6525 or equivalent, preformatted.

Bundled software: Windows and DOS backup software that supports either QIC-80 or QIC-525 tape format.

Other requirements: Floppy interface splitter or other interface cable, mounting hardware for internal drives.

Red flags: *Ensure full QIC-80 compatibility for QIC drives; avoid proprietary controller cards; avoid paying more than a dollar per megabyte of compressed storage capacity.*

Desktop Systems

CPU: Intel 486DX2/66 upgradable.

Secondary cache: 256K four-way set-associative.

Memory: 8MB expandable to 32MB, 36-bit SIMMs.

Hard drive: 230MB or larger IDE.

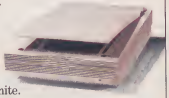
Video: VL-Bus Windows accelerator, 15-inch monitor or larger with 72Hz refresh at 1,024 by 768 pixels.

Slots: Eight ISA slots for full-size case (including two VL-Bus), three ISA slots for small-footprint case with integrated VL-Bus video and drive.

Drives and bays: One 3½-inch 1.44MB and one 5¼ 1.2MB floppy drive, five half-height 5¼-inch bays.

Red flags: *Pentium-upgradable systems should include CPU, secondary CPU cache, and memory on a daughtercard rather than the motherboard; avoid Micro Channel and proprietary local-bus slots.*

Flatbed Color Scanners



Resolution: 400 to 600 dpi.

Image scanning capabilities: 24-bit color (16.7 million colors), grayscale (256 shades of gray), black and white.

Compatibility: TWAIN.

Interface: SCSI or SCSI-2.

Image controls: External controls for adjusting brightness, contrast, and color of scan; adjustable resolution.

Bundled software: 24-bit image-editing software, OCR software.

Features and options: Automatic document sheet feeder, transparency feeder.

Other requirements: Cables and SCSI adapter card included in price.

Red flags: *Avoid models that require multiple passes to scan color documents.*

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Circle 145 on reader service card.

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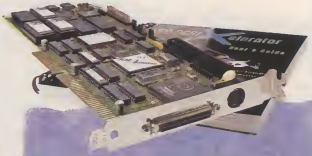

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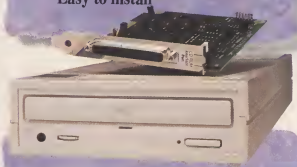

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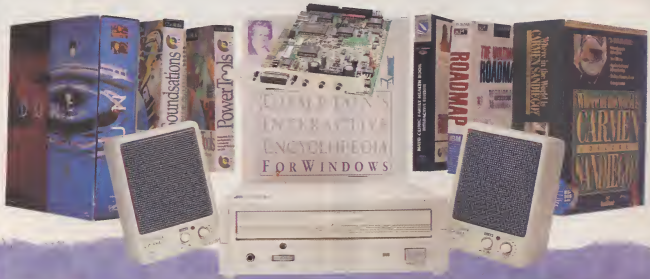

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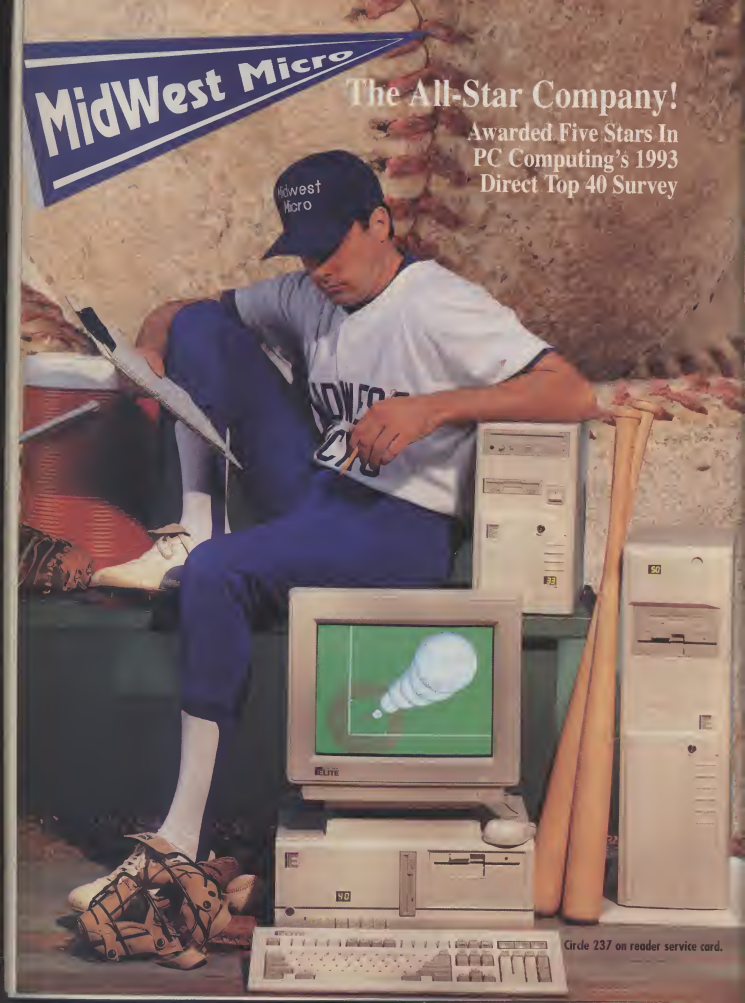
Circle 123 on reader service card.


MidWest Micro
The All-Star Company!
Awarded Five Stars In
PC Computing's 1993
Direct Top 40 Survey
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Micro
Circle 237 on reader service card.

MidWest Micro—Known For Our Hard-Hitting Products

At MidWest Micro, we build products that last—like Elite Computer Systems. But that's really no surprise. Afterall, the Midwest is where professional baseball began...and where Louisville Sluggers are made.

Our manager knows a team is only as strong as its weakest player. So, just as Louisville Sluggers are made from the choicest woods, Elite Computers are constructed from the finest components. Each Elite System is custom designed and engineered for superior performance and reliability.

First we select durable cases to hold and protect our Elite Systems. Then we add the fastest motherboards, the most reliable hard drives and the highest-resolution monitors.

Your Chance For A Steal

With Elite Systems, you have the hometown advantage. Elite Computers are assembled on-site to eliminate double handling costs and ensure strict quality control. Elite Systems come with SVGA cards, high-speed RAM boards, 3.5" floppy drives, formatted hard drives and Microsoft DOS 6.0 and Microsoft Windows* installed. When your Elite arrives, it's ready to go. Simply open the box—plug it in—and start computing.

At MidWest Micro You're Never Out

You're always a winner with MidWest Micro. Each Elite System comes backed by a 30-Day Complete Satisfaction Guarantee, a Full-Year Limited Warranty, an Immediate Parts Replacement Policy and 72-Hour Repair Service. And since all Elite Systems are repaired on the premises, you're guaranteed the fastest turn around time and best service available.

Fielder's Choice

Each Elite Computer comes with a number of options so you'll never outgrow your system. For details on our complete line of hard drives, monitors, tape backups, memory upgrades, modems, printers and more, call your MidWest Micro Representative at 1-800-572-8844.

Fast Delivery

You'll need a radar gun to clock our fast delivery. Most standard configurations are shipped within 24 hours. If you'd prefer a custom configuration, we'll do our best to have it on your doorstep within 72 hours.

**Some configurations do not ship with Windows.*

The Major Leagues

Deluxe ISA Systems

486DX-33 $1369
#003360
Statistics:
- 80486DX-33 Processor
- 128K High-Speed Cache
- 4 Mb High-Speed RAM
- 130 Mb IDE Hard Drive
- 1.44 Mb 3.5" Floppy Drive
- 1.2 Mb 5.25" Floppy Drive
- 14" SVGA .28 Non-Interlaced Color Monitor
- 16-Bit SVGA Card with 1 Mb
- 1 Parallel, 2 Serial & 1 Game Port
- 101-Key Enhanced Keyboard
- High-Resolution, 3-Button Mouse
- 5-Bay Mini-Tower Case
- ***FREE*** Microsoft DOS 6.0 *Installed*
- ***FREE*** Microsoft Windows *Installed*

486DX2-50 $1479
#003361

486DX-50 $1519
#003362

486DX2-66 $1599
#003363

VESA Ready Deluxe Systems

486SX-33 $999
#006300
Statistics:
- VESA Local Bus Motherboard
- 80486SX-33 Processor
- 128K High-Speed Cache
- 2 Mb High-Speed RAM
- 80 Mb IDE Hard Drive
- 1.44 Mb 3.5" Floppy Drive
- 14" SVGA .39 Color Monitor
- 16-Bit SVGA Card with 512K
- 1 Parallel, 2 Serial & 1 Game Port
- 101-Key Enhanced Keyboard
- 5-Bay Mini-Tower Case
- ***FREE*** Microsoft DOS 6.0 *Installed*

486SX-33 $1279
#006301
Statistics:
- VESA Local Bus Motherboard
- 80486SX-33 Processor
- 128K High-Speed Cache
- 4 Mb High-Speed RAM
- 130 Mb IDE Hard Drive
- 1.44 Mb 3.5" Floppy Drive
- 1.2 Mb 5.25" Floppy Drive
- 14" SVGA .28 Non-Interlaced Color Monitor
- 16-Bit SVGA Card with 1 Mb
- 1 Parallel, 2 Serial & 1 Game Port
- 101-Key Enhanced Keyboard
- High-Resolution, 3-Button Mouse
- 5-Bay Mini-Tower Case
- ***FREE*** Microsoft DOS 6.0 *Installed*
- ***FREE*** Microsoft Windows *Installed*

VESA Ready Multimedia Systems

486DX-33 $1769
#006308
Statistics:
- VESA Local Bus Motherboard
- 80486DX-33 Processor
- 128K High-Speed Cache
- 4 Mb High-Speed RAM
- 170 Mb IDE Hard Drive
- 1.44 Mb 3.5" Floppy Drive
- Internal Multimedia CD-ROM Drive with Software Library
- High-Performance Sound Card
- Digital-Quality, Compact Speakers
- 14" SVGA .28 Non-Interlaced Color Monitor
- 16-Bit SVGA Card with 1 Mb
- 1 Parallel, 2 Serial & 1 Game Port
- 101-Key Enhanced Keyboard
- High-Resolution, 3-Button Mouse
- 5-Bay Mini-Tower Case
- ***FREE*** Microsoft DOS 6.0 *Installed*
- ***FREE*** Microsoft Windows *Installed*

486DX2-50 $1879
#006309

486DX2-66 $1999
#006310

VESA Value Systems

486DX-33 $1469
#006302
Statistics:
- VESA Local Bus Motherboard
- 32-Bit VESA Local Bus SVGA Video Card
- 32-Bit VESA Local Bus IDE Card
- 80486DX-33 Processor
- 128K High-Speed Cache
- 4 Mb High-Speed RAM
- 170 Mb IDE Hard Drive
- 1.44 Mb 3.5" Floppy Drive
- 1.2 Mb 5.25" Floppy Drive
- 14" SVGA .28 Non-Interlaced Color Monitor
- 1 Parallel, 2 Serial & 1 Game Port
- 101-Key Enhanced Keyboard
- High-Resolution, 3-Button Mouse
- 5-Bay Mini-Tower Case
- ***FREE*** Microsoft DOS 6.0 *Installed*
- ***FREE*** Microsoft Windows *Installed*

486DX2-50 $1579
#006303

486DX2-66 $1699
#006304

VESA Windows Systems

486DX-33 $1699
#006305
Statistics:
- VESA Local Bus Motherboard
- 32-Bit VESA Local Bus IDE Card
- 80486DX-33 Processor
- 128K High-Speed Cache
- 4 Mb High-Speed RAM
- 210 Mb IDE Hard Drive
- 1.44 Mb 3.5" Floppy Drive
- 1.2 Mb 5.25" Floppy Drive
- 15" SVGA .28 Non-Interlaced Multi-Scan Color Monitor
- Diamond Stealth 24 VESA Local Bus SVGA Video Card
- 1 Parallel, 2 Serial & 1 Game Port
- 101-Key Enhanced Keyboard
- High-Resolution, 3-Button Mouse
- 7-Bay Full-Tower Case
- ***FREE*** Microsoft DOS 6.0 *Installed*
- ***FREE*** Microsoft Windows *Installed*

486DX2-50 $1809
#006306

486DX2-66 $1929
#006307

VESA CAD Systems

486DX-33 $2329
#006311
Statistics:
- VESA Local Bus Motherboard
- 32-Bit VESA Local Bus IDE Card
- 80486DX-33 Processor
- 128K High-Speed Cache
- 8 Mb High-Speed RAM
- 340 Mb IDE Hard Drive
- 1.44 Mb 3.5" Floppy Drive
- 1.2 Mb 5.25" Floppy Drive
- 17" SVGA .28 Non-Interlaced Digital Color Monitor
- Diamond Stealth 24 VESA Local Bus SVGA Video Card
- 1 Parallel, 2 Serial & 1 Game Port
- 101-Key Enhanced Keyboard
- High-Resolution, 3-Button Mouse
- 7-Bay Full-Tower Case
- ***FREE*** Microsoft DOS 6.0 *Installed*
- ***FREE*** Microsoft Windows *Installed*

486DX2-50 $2439
#006312

486DX2-66 $2559
#006313

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Circle 272 on reader service card.

AD#M1001

Elite 486SLC-33 Notebooks

MidWest Micro

Elite 486SLC-3 Subnot

When The Game Goes Into Extra Innings, You'll Be Glad You Have An Elite

Not only do the Elite 486SLC-33 Color and Monochrome Notebooks give you more computing power, they give you the power to compute longer. Use the SUSPEND/RESUME feature to avoid unnecessary system rebooting and compute up to 6 hours on a single charge*.

For those afternoon games, the Elite provides a large, non-glare VGA screen that eliminates distortion, flickering and eye strain so you can compute comfortably. Text and graphics appear at 640 x 480 resolution in 64 gray shades or 256 colors.

And if you get caught up in the action, a quick glance at the LCD panel lets you know which drives are being accessed, when battery power is low, what function keys are enabled, whether external power is being used and if there is a modem ring. With the Elite's LCD panel, you'll never feel like you're out in left field.

Elite 486SLC-33 Color

Model	Item #	Price
80 Mb	005461	$1699
120 Mb	005466	$1769
200 Mb	005471	$1889

Elite 486SLC-33 Monochrome

Model	Item #	Price
80 Mb	005446	$1209
120 Mb	005451	$1279
200 Mb	005456	$1399

Statistics:

Processor:
Cyrix 486SLC
Processing Speed:
33 MHz
RAM:
2 Mb RAM, expands to 8 Mb
Hard Drive:
80 Mb, 120 Mb or 200 Mb
Floppy Drive:
Built-in 1.44 Mb 3.5"
Screen:
Color - 9", 256 colors
Monochrome - 10", 64 gray shades
Video RAM:
Color - 512K
Monochrome - 256K

Keyboard:
83 key with 101-key emulation
2-button thumball mouse
Weight:
Color - 5.7 lbs. with battery
Monochrome - 5.4 lbs. with battery
Battery Life*:
Color - 4 hours
Monochrome - 6 hours
640 x 480 resolution
Simultaneous video
Advanced Power Management
One parallel and one serial interface
External VGA monitor and keyboard connectors
FREE* AC adapter carrying case and MS-DOS 6.0 *installed
One-year manufacturer's warranty

Take Me Out To The Ball Game

Compact and lightweight, the 486SLC-33 fits you like a glove. It weighs only 3.7 lbs. and measures 10" x 7" x 1.6", but is more advanced than notebooks twice its size. The Elite 486SLC-33 Subnote comes with a 33 MHz Cyrix processor and 2 Mb of RAM. Need grand slam power? Add an easy-to-install RAM upgrade or take advantage of the latest technology with the Subnote's Type II PCMCIA interface. It allows you to install PCMCIA cards for flash memory, modems and network adapters.

You'll never run out of storage space with the Elite Subnote. Once you fill its 80 Mb or 120 Mb removable hard drive, simply take it out and insert another hard drive. There's no limit to the number of hard drives you can fill...or files you can save.

You'd think a small sub notebook would be hard to work on—but it's not. The Elite Subnote rounds out its bases with a 7.4" high-contrast screen that displays 640 x 480 VGA resolution and 64 gray shades.

Elite 486SLC-33 Subnote

Model	Item #	Price
80 Mb	005415	$1359
120 Mb	005416	$1449

Statistics:

Processor:
Cyrix 486SLC
Processing Speed:
33 MHz
RAM:
2 Mb RAM, expands to 8 Mb
Hard Drive:
Removable 80 Mb or 120 Mb hard drive
Screen:
7.4" high-contrast screen
640 x 480 VGA resolution
64 gray shades
Video RAM:
256K
Weight:
3.7 lbs. with battery
Size:
10" x 7" x 1.6"

Battery:
Nickel metal hydride battery
Up to eight hours with APM*
Keyboard:
79-key with 101-key emulation
Built-in 2-button trackball
Drag button
Interfaces and Ports:
Parallel and serial interfaces
External keyboard, monitor and modem connectors
External floppy port
PCMCIA Type II slot
Advanced Power Management
Simultaneous video
***FREE* external 3.5" 1.44 Mb floppy drive, AC adapter and utilities support disk**
FREE* MS-DOS 6.0 *installed
One-year manufacturer's warranty

*Battery life measured with Power Management enabled. Actual battery life may vary.

Elite 486SX/DX Notebooks

MidWest Micro

Elite 486SX-25 Subnote

With 27 Notebooks to choose from, everyone is a player.

Everyone loves our new line of Elite 486 Notebooks. Choose your Elite with an Intel 486SX-25, 486DX-33 or 486DX2-50 processor, select an active color, dual-scan color or monochrome screen and then pick the hard drive that best meets your needs—from 80 Mb up to 200 Mb!

No matter which processor, screen or hard drive you choose, your Elite 486 Notebook comes standard with 4 Mb of RAM and can be upgraded to 20 Mb.

Isn't it a relief to know that whether you're a teacher, doctor, lawyer, sales representative, student or homemaker, there's an Elite 486 Notebook perfectly matched to your needs...*and* your budget?

Statistics:

Processor:
Intel 486SX-25, 486DX-33 or 486DX2-50
RAM:
4 Mb, expands to 20 Mb
Hard Drive:
80 Mb, 120 Mb or 200 Mb
Screen:
10", 640 x 480 VGA resolution
Backlit display
Color - 256 colors
Monochrome - 64 gray shades
Battery Life*:
Active Color - 3 hours
Dual-Scan Color - 4 hours
Monochrome - 6 hours

Weight:
Color - 6.9 lbs.
Monochrome - 6.4 lbs.
512K Video RAM
86 keys with 101-key emulation
Built-in trackball
Built-in 1.44 Mb, 3.5" floppy drive
Advanced Power Management
One parallel and one serial port
External VGA and keyboard connectors
One PCMCIA Type III slot/
two Type II slots
***FREE* AC adapter and utilities disk**
***FREE* MS-DOS 6.0 installed**

486SX-25 Elite Notebooks

	Monochrome	Dual-Scan Color	Active Color
80 Mb	$1599 #005500	$2339 #005505	$3219 #005510
120 Mb	$1649 #005501	$2389 #005506	$3269 #005511
200 Mb	$1739 #005502	$2489 #005507	$3369 #005512

486DX-33 Elite Notebooks

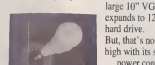
	Monochrome	Dual-Scan Color	Active Color
80 Mb	$1869 #005515	$2599 #005520	$3489 #005525
120 Mb	$1919 #005516	$2659 #005521	$3539 #005526
200 Mb	$1999 #005517	$2749 #005522	$3629 #005527

486DX2-50 Elite Notebooks

	Monochrome	Dual-Scan Color	Active Color
80 Mb	$2089 #005530	$2839 #005535	$3719 #005540
120 Mb	$2139 #005531	$2889 #005536	$3759 #005541
200 Mb	$2239 #005532	$2979 #005537	$3859 #005542

The Best In The Field...

If you're looking for a powerful portable, the Elite 486SX-25 Subnote is a great catch. Weighing a mere 3.9 lbs., the 486SX-25 Subnote features a large 10" VGA screen, 4 Mb of RAM that expands to 12 Mb and up to a 200 Mb hard drive.



But, that's not all! The Elite Subnote scores high with its special Intel processor for low power consumption, Advanced Power Management and PCMCIA Type II slot for modems, flash memory, network adapters and more.

All this for under $1500? Only at MidWest Micro—so call us today and get your Elite Subnote for peanuts.

486SX-25 Subnote

Model	Item #	Price
80 Mb	005575	$1499
120 Mb	005576	$1549
200 Mb	005577	$1639

Statistics:

Processor:
Intel 486SX
Processing Speed:
25 MHz
RAM:
4 Mb expands to 12 Mb
Hard Drive:
80 Mb, 120 Mb or 200 Mb
Screen:
10", 640 x 480 VGA resolution
Backlit display
64 gray shades

Battery Life*:
5 hours
Weight:
3.9 lbs.
512K Video RAM
83 keys with 101-key emulation
Built-in trackball
External 1.44 Mb, 3.5" floppy drive
Advanced Power Management
One parallel and one serial port
External VGA and keyboard connectors
One PCMCIA Type II slot
***FREE* AC adapter**
***FREE* MS-DOS 6.0 installed**

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MasterCard VISA DISCOVER

For your protection we check thoroughly for stolen credit cards.

*Battery life measured with Power Management enabled. Actual battery life may vary.

Circle 276 on reader service card.

AD#M1003

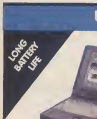
SPEED DEMON

Active Matrix Upgradability

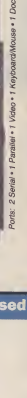
66 MHz & Local Bus Video

Removable Hard Drive Fax/Modem Option

PCMCIA Type III Expansion Slot

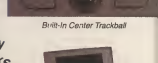


Memory Upgrades Made Easy

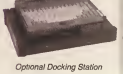


Ports: 2 Serial • 1 Parallel • 1 Video • 1 Keyboard/Mouse • 1 Docking Station

13 MILLION WIN MARKS



Built-In Center Trackball



Optional Docking Station

Specifications Choice of Upgradable CPU's i486SX-25, DX-33, DX2-50 and DX2-66 • Local Bus Video • Available in Upgradable Active Matrix Color, STN Dual Scan Color & Mono Displays • Built-In Center Trackball • PCMCIA Type III • Over 3 Hours of Battery Life • 4MB RAM Expandable to 32MB • Removable 80MB Hard Drive (120-340 avail) • 5.8 lbs. Including Battery • Optional Internal Fax/Modem and Optional Desktop Docking Station

(Now available with low power 3.3v CPU'S !)

TravelPro 5300 Series

Model Display	Prices Starting At:	
5325 iSX-25	$3325	Active Matrix Color
5325 iSX-25	$2350	STN Dual Scan Color
5325 iSX-25	$1675	Monochrome

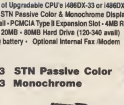
Unsurpassed Variety & Value

LONG BATTERY LIFE

TravelPro 7525 Series

Intel 486SL-25 3.3v CPU with APM for up to 4 hours of battery life. • Available In Active Matrix or Mono Displays • PCMCIA Type III Expansion Slot • Large 25mm Center Trackball • 120MB Removable Hard Drive upgradable to 340MB • 4MB RAM upgradable to 20MB • Removable Keyboard, allows for instant upgrades • 6.3 lbs including battery

	Starting At:
7525 Active Matrix Color	$3395
7525 Monochrome	$1895



TravelPro 4500 Series

Choice of Upgradable CPU's i486DX-33 or i486DX2-50 • Available in STN Passive Color & Monochrome Displays • Built-In Trackball • PCMCIA Type II Expansion Slot • 4MB RAM Expandable to 20MB • 80MB Hard Drive (120-340 avail) • 6.1 lbs. including battery • Optional Internal Fax /Modem

	Starting At:
4533 STN Passive Color	$2295
4533 Monochrome	$1675

TravelPro 7325 Series

i486SX-25 • STN Dual Scan Color or Monochrome Displays • 25mm Built-In Center Trackball with Palmrests • 4MB RAM Expandable to 20MB • Removable 80MB Hard Drive (120-340 avail) • Removable Keyboard for Instant Upgrades • Only 5.9 lbs. Including battery • Optional Internal Fax/Modem

	Starting At:
7325 Dual Scan Color	$2250
7325 Monochrome	$1575

ProBook Series

486-25 or 486-33 CPU • Built-InTrackball (Probook IV only) • 10" 64 Greyscale Monochrome Display • Lightweight • Only 5.5 lbs. including battery • 4MB RAM Expandable to 8MB • 80MB Hard Drive 120-200 available • Optional Internal Fax/Modem

		Starting At:
ProBook III	486-25	$1280
ProBook IV	486-33	$1395

The AMS Advantage

- Free Shipping
- 30 Money Back Satisfaction Guarantee
- 1 Year Warranty on Parts & Labor
- Lifetime Toll-Free Technical Support
- 24 Hour On-Line BBS
- Optional Premium Support Package

Here at AMS we stay on the cutting edge of technology to bring you the best selection of the newest features available in mobile computing. We've listened to our customers and know what they want: more powerful CPU's, better expandability, easy upgradability, longer battery life, lightweight design, larger capacity hard disk storage, built-in pointing devices, docking stations and an eye for ergonomics and ease of use All backed by the industries best standard and & premium support services.

Experience the difference!

Corporate, Government and Dealer pricing available

Circle 206 on reader service card.

intel inside

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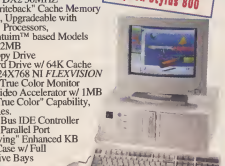
DX2 Combo System

486DX2-50 MHz and the Award Winning Epson Stylus 800

- Genuine Intel486™ DX2 50MHZ
- 128K Ultra-fast "Writeback" Cache Memory
- OverDrive Ready™, Upgradeable with Intel's OverDrive™ Processors, including future Pentium™ based Models
- 4MB RAM, Max. 32MB
- 3.5" (1.44MB) Floppy Drive
- 340MB < 13ms Hard Drive w/ 64K Cache
- 14" Super VGA 1024X768 NI *FLEXVISION* .28 mm MultiScan True Color Monitor
- 32-Bit VESA LB Video Accelerator w/ 1MB Memory, 16.7 M "True Color" Capability, 1280x1024i Max. Res.
- VESA 32-bit Local Bus IDE Controller
- 2 Serial Ports and 1 Parallel Port
- 101 Key "Space Saving" Enhanced KB
- Premium Desktop Case w/ Full 200w P.S. and 7 Drive Bays



Plus...

- **Epson Stylus 800** Laser Quality InkJet printer 180cps, 360 dpi resolution
- MS DOS 6, Windows 3.1 and a Genuine Microsoft Mouse

An Incredible Value, Only... $1995

Ultimate *FlexMedia!*

PC Computing's August 1993 Direct Vendor Top 40 List!
Overall Rating ★★★★★

486DX2-66 MHz and MultiMedia Plus...Panasonic Laser Printer

All This For Only... $2995

With this unbelievable offer, USA Flex has taken MultiMedia to a new high in *value* and a new low in *price!*

Start with our VESA local bus 486DX2-66MHz PC. Next, add a huge 340MB hard drive and 8MB of RAM for virtually any of your computing needs. Then, include a fast 32-bit VESA local bus true color video accelerator card and a 14", .28 dot pitch SVGA *FLEXVISION* full-scan monitor for up to 16.7 million rich, vibrant colors. Finally, add a Mitsumi CD-ROM drive, and an Aztech NX Pro stereo sound card complete with speakers and hundreds of dollars worth of exciting and educational CD titles. Just one more thing. So you're totally convinced this is one of the most phenomenal PC bundles ever offered, we've even included a Panansonic KX-P4410 laser printer to give you everything you need!

FLEX VL486D-40

- Cx486D 40MHz Microprocessor with Cx487S 32-bit Math Coprocessor
- On-chip cache with 8 write buffers
- 128K "Writeback" Cache Memory
- 238-Pin ZIF Socket, upgradeable to latest Pentium™ based architecture
- 4MB RAM, 32MB Max. RAM
- 3.5" (1.44MB) Floppy Drive
- 210MB < 13ms Hard Disk Drive w/ 64K Cache
- 14" Super VGA 1024 X 768i *FLEXVISION* .39 mm MultiScan True Color Monitor
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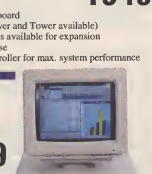

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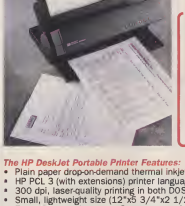

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6450375 (1Meg)	80-041	79.00
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6451060 (4Meg)	80-A21, A-61, 80-A31, 80-111, 80-311	189 00
6450603 (1Meg)	35SX, 40SX, 55SX, Model-70's, P-70	45 00
6450604 (2Meg)	70-061, E61, 121, 50Z, 55SX, 65SX, P-70, 55LS, 65LS, X-Station 120 & 130, 35SX, 35LS, 40SX	82 00
6450608 (2Meg)	70-A21, A-61, B-21, B-61, 35SX, 35LS, 40SX Value Point 325T	86 00
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34F2933 (4Meg)	35SX, 40SX, 55SX, 65SX, 55LS, 65LS	159 00
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92F9935 (2Meg)	P/S1 & P/S1/386SX-2121	92 00
92F9694 (4Meg)	P/S1 & P/S1/386SX, Model-2121	144 00
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DeskPro 386/33L, 486/33L	(Exp 8d)	116569-001	209 00
DeskPro 386/25, 386/20	1Meg Module	113131-001	79 00
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DeskPro 386/25E	4Meg Exp 8d	113645-001	239 00
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LTE LITE 4/25C	4Meg Module	142337-002	199 00
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T2000SXE/2200SX/T1800, 1850, C	8Meg	PC-PA2002U	279 00
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T4400SX, SXC T6400	8Meg	PC-PA2005U	299 00
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Epson Action Laser II	–	–	99	–	169	–	–	249	–	–	–	–
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NEC 90, 290	–	–	–	109	–	–	–	–	–	–	–	–
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Dki 830, 840	–	–	–	109	–	–	–	–	–	–	–	–
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Z-Soft Publisher's Typefoundry	319
Soft Type (includes 62 typefaces)	119

Color Printers

Canon BJC 800 / BJC 820	1949 / 2149
DataProducts Jolt PS (6MB, solid ink)	5985
Fargo Primera (thermal wax printer)	739
Primera Dye Sublimation Option	219
Hewlett Packard Paintjet / Paintwriter Mac	788
Deskjet 500C PC / Deskwriter 500C Mac	529
Deskjet 550C PC / Deskwriter 550C Mac	699
Deskjet 1200C / Deskjet 1200C PS	1499 / 1999
Paintjet XL 300	2397
Paintjet XL 300 with 6MB total RAM	2695
Paintjet XL 300 with 10 MB total RAM	2881
IBM Lexmark 4079 Color Jetprinter PS	2589
NEC ColorMate PS Model 40	4695
QMS ColorScript Laser 1000 (colorlaser)	11685
RasterOps CorrectPrint300i (dye-sub.)	CALL
Seiko Personal Colorpoint PSE	2685

Utilities for DTP & Windows

Application Techniques Pizazz Plus 4.0	99
Aristocad Soft Kicker / MoreWindows	64 / 49
Berkeley Systems After Dark for Windows	19
CAI Freedom of Press (MAC or PC)	249
Central Point PC Tools 8.0	119
PC Tools 7.1 / PC Tools 7.1 & Antivirus	79 / 99
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Hijaak for Windows	123
LaserTools PrintCache (Fastest print buffer)	98
Printer Control Panel (Adobe endorsed!)	45
Metro LaserTwin (HP emul/Canon,ink/dot)	117
Okna Desktop Set for Windows	49
Free with any order over $1,000!	
Qualitas 386 Max 6.0	55
Quarterdeck QEMM 386 6.0	57
Reference Software Grammatik IV/Win.3	55
Rightsoft Rightwriter 4.0	52
Symantec Norton Desktop for Windows	89
Norton Utilities 6	108
Symsoft Hotshot Graphics (scrn. capt./ed.)	159
U-Lead Image Pals (image database mngr)	149

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Globalink Power Translator	259
Power Translator Professional	788
Available in French, German or Spanish.	
Power Translator/Translator Pro Russian	CALL
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Microtac Language Assistant	68
Available in French, German, Italian or Spanish	

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AZTech NX Pro 16 - 16 bit sound card, with interface for Panasonic & Mitsumi CD, optional SCSI and optional Sony 31A interface	199
Creative Labs Sound Blaster Deluxe	88
Sound Blaster Pro Deluxe	129
Sound Blaster 16 ASP & free CD encyclop.	219
Covox Voice Blaster (voice recognition) from the developers of the AirForce's Bionic Ear	98
Digispeech Port Able Sound Plus	169
Media Vision Pro Audio Spectrum Plus	149
Pro Audio Spectrum 16 Basic	149
Pro Audio Spectrum 16	165
Thunder & Lightning	219
Pro Movie Spectrum	299
Pro Movie Studio	358
Pro Audio Studio	205
Audio Port	135
Microsoft Sound System for Windows	189
Turtle Beach MultiSound	529
Multisound Multi Bundle w/ WAVE Lite	689

TypeReader

"Expervision Incorporated's TypeReader for Windows pushes the technological envelope in optical character recognition by reading small and cursive text and retaining complex formatting." – PC Week

$429

Memory for... HP LaserJet 4

$79 1MB **$139** 2MB
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MICROTEK *ScanMaker II*

New includes Photoshop!

ScanMaker II with Photoshop LE	$879
ScanMaker IIXE with Photoshop (full)	$1178
ScanMaker IIER with Photoshop (full)	$1349
Auto Document Feeder (50 sheets)	$497
Transparency Adapter	$669
ScanMaker 35t (Slide Scanner)	$1485
ScanMaker 45t (transparencies)	$5985
ScanMaker 1850 [24-bit Slide Scanr]	$999
MS-II (sheetfed, 50 sheets, OmniType)	$625
Scooter (compact, 400dpi, 24-bit color)	CALL
Scan-In-Dex (bus. card scanner w/OCR)	$389

Free with the purchase of a ScanMaker II or IIXE: a 24 bit Genoa video card (PC) or your choice of Fractal Painter, Wordscan +, or Morph & Kai's Power Tools (Mac).
Offer good through 9/30/93.

Printers • Printer Upgrades

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PostScript Cartridge for HP II with 2MB	398
PostScript Cartridge for HP II with 4MB	498
Compaq Pagemarq printers	CALL
DataProducts LZR 1560 (11x17,400 dpi)	3285
Hewlett Packard Postscript Cart. Level 1	389
Postscript Cart.+ Level II w/ATM, ATM+	497
Deskjet 500 / Deskjet 550C	399 / 699
Laserjet—see spotlight on opposite page	
Transcend Memory	
HP II, IID 1MB/ 2MB/ 4MB	89 / 139 / 239
HP III, IIIP,IIP 1MB/ 2MB/ 4MB	79 / 109 / 179
IBM 4039 Lsrpmtr10R, PS 600dpi,10ppm	1369
4039 Laserprinter 10D, PS 600dpi, duplex	1899
4039 Laserprinter 12R, PS 600dpi,12ppm	1729
4039 Laserprinter 12L, PS 600dpi, LAN	2459
4039 Laserprinter 16L, PS 600dpi, LAN	2799
LaserMaster WinPrinter 800	1389
WinJet 800 / WinJet 1200	479 / 759
NEC SilentWriter 95F (Postscript, 2 MB)	1299
SilentWriter 95fx (with Postscript Fax)	1429
SilentWriter 97 (Postscript, 2 MB, 10ppm)	1499
SilentWriter 97fx (with Postscript Fax)	1699
NewGen Systems Turbo PS 880 (800 dpi)	3699
Turbo PS 880P (800 DPI, 4 ppm)	2089
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ImagerPlus 12 (1200x1200 DPI, 11 x 17)	CALL
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Doc It 3000 (300 DPI, PCL 4 emulation)	2596
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Pacific Data Pacific Page & others	CALL
ProTracer (360 DPI 17x22 plotter/printer)	1239
ProTracer with HP-GL & 5MB RAM	1689
PacificTalk Interface (for ProTracer)	177
5MB Upgrade (for ProTracer)	389
8MB Upgrade (for ProTracer)	647
PostScript Emulation (for ProTracer)	379
Sheet Feeder I / II (for ProTracer)	119 / 109
QMS PS-420 600dpi, 4ppm, Postscript	1789
PS- 815 MR (New 600 DPI printer)	3899
PS-860 (600 DPI, 11" x 17", 12 MB)	3999
Sharp JX-9600 (600 DPI, RISC, 2 bins)	1189
JX-9600PS (600 DPI, PS, RISC, 2 bins)	1598
Texas Instruments Microlaser Turbo PS 35	1599
Microwriter Basic 5ppm, 300 DPI	639
Microwriter PS 23 5ppm, 300 DPI, 23 fonts	869
Microwriter PS 65 5ppm, 300 DPI, 65 fnts	1129
Xante Accel-a-writer 8100 (upto 960dpi)	CALL
XLI Printers & Upgrades See Box on this Page	

Announcing big savings on OmniPage and OmniPage Pro OCR from Caere. We include a coupon for a $200 rebate on OmniPage Pro, or a $100 rebate on OmniPage, with the 40purchase of either product. Rebate offer good through October 15, 1993.

OmniPage	$449
Mail-in Rebate	-$100
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Asymetrix Multimedia Toolbook 1.5	399
Media Blitz!	65
Multimedia Make Your Point	65
Avery Label Pro	54
Computer Support Arts & Letters Ed. 3.1	399
Corel Draw for OS/2	189
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Draw 4.0 Upgrade 5.25" or 3.5" with CD	228
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Delrina Per:FDRM Pro Plus	259
Fractal Design Fractal Sketcher for Win.	109
Fractal Painter 2.0 for Windows	275
Frame Tech. FrameMaker for Windows	499
Gold Disk Professional Draw	259
Lotus Ami Professional 3.0	249
Ami Pro 3.0 Competitive Upgrade	98
MacroMedia Action! for Windows	335
Micrografx Designer 3.1w/ ATM & ATA	369
Photo Magic / Graphics Works	99 / 199
Windows Draw	89
Picture Publisher 4.0	398
Picture Publisher 3.0 w/ Mars Color Artist	499
Microsoft Windows 3.1	89
Word 6.0	299
Word for Windows	299
Excel 4.0 for Windows	294
Publisher for Windows	129
Power-Up Express Publisher	99
Express Publisher for Windows	118
Quark Xpress for Windows	564
Software Publishing Harvard Graphics 3.0	349
Harvard Graphics for Windows	349
Spinnaker PFS: First Publisher 3	58
PFS Publisher for Windows	96
Window Works 2.0	79
Timeworks Publish It! v2.0 w/Design Ideas	147
Wordperfect Drawperfect	269
Wordperfect 6.0 for DOS	258
Wordperfect Additional Station	168
Wordperfect for Windows	269
Writing Tools Group Correct Grammar	CALL
Xerox Ventura Publisher 4.1	449
Ventura Publisher 4.0 (Free Upgrade to 4.1)	399
Ventura Database Publisher	199
Ventura ColorPro / Picture Pro	605 / 568
Ventura Ad Pro	497
Ventura Publisher 4.1 Network Node	288
Z-Soft PhotoFinish	118
PC Paintbrush Vor V+	69 / 112

XLI LaserPix 5.0

2400 DPI for Graphics and 1200 DPI for Text on your HP LaserJet II or III. **$1399**

Now Supports Laserjet 4!

"Windows 3.0 and 3.1 users can now combine high-resolution PostScript-quality type and high-quality halftone pictures in the same document with LaserPix. . Teamed with a user's standard desktop laser printer, the LaserPix board becomes a complete printing solution for any text-and-image publishing application that benefits from up to 1,200 dpi text and line art, and up to 2,400 dpi halftoned photographs" – TYPEWORLD

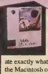
Includes: SuperPrint, print utility software.

LaserPix 5.0 with Laserjet 4	2793
ImageXpert 1000 (1200 DPI)	2599
ImageXpert 5000 (1200 DPI)	5799

QuarkXPress Now you can control the design and production process with precision, power, and ease. Generate high-quality publications quickly and efficiently with the reliability professional designers and publishers trust. QuarkXPress for windows is the most sophisticated publishing program you will find. **$564**

Get both QuarkXPress and Photoshop for $999

Photoshop for Windows



Adobe Photoshop 2.5 software is the world's leading photo design and production tool. It lets you create exactly what you imagine, whether you work in the Macintosh or Windows environment.

ADOBE Adobe Systems Incorporated **$529**

Photoshop for Windows with Mitsumi Photo-CD drive	Internal $609	External $729
Photoshop for Windows with Toshiba Photo-CD drive	Internal $919	External $1019
Photoshop for Windows with Texel Photo-CD drive	Internal $829	External $929

CREATIVE

Discovery CD 8bit Int. / Ext.	$389 / $489
Discovery CD 16bit Int / Ext	$465 / $559
Edutainment CD Int. 8 bit	$465
Edutainment CD Ext. 8 bit	$589
Edutainment CD Int. 16 bit	$535
Edutainment CD Ext. 16 bit	$629
Digital Edge	$649
Omni CD	$295
Video Blaster w/ Video for Win.	$329
VideoSpigot for Windows	$439
Sound Blaster Deluxe	$78
Sound Blaster Pro Deluxe	$124
Sound Blaster 16 ASP including free encyclopedia on CD-ROM !	$219
Port Blaster (external sound card)	$169
Labtec CS-150 Speakers	$15
Labtec Stereo Headphones	$9
Labtec Deluxe Microphone	$19

Primera COLOR PRINTER

Introducing the Fargo Primera color thermal wax transfer printer for Windows, at inkjet prices! The Primera prints up to four times faster than ink jets, requires no drying time, eliminates wrinkling and smearing, and costs much less per page than ink jets. When comparing the Primera to the $4,995 QMS Colorscript 210 in the March 1993 issue, PC Computing called it a "knockout bargain" and gave it an MVP finalist award. "A quality color printer at an impressively low price."
New Dye-Sub option $219

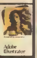
FARGO ELECTRONICS INCORPORATED **$739**

Adobe Illustrator

Illustrator 4.0 $399

(for Windows)

"★★★★★ Top notch, a must buy."– Publish



Competitive Upgrade $179

"The Umax UC-1200S color flatbed scanner delivers vibrant high-resolution images and sharp line art." "A fast high-resolution scanner that won't bust your budget." "The Umax UC-630 excels in speed and color accuracy." "The Umax UC-630 is a top performer." – MacUser For PC or MAC.

New includes Photoshop!

UT-A Transparency Adapter $695

UC-630 (600 DPI, 24 bit color) with Photoshop LE software	$889
UC-630 with Photoshop LE and 25 sheet automatic document feeder	$1287
UC-840 (800 DPI, 24 bit color) with Photoshop LE software	$1245
UC-840 with Photoshop LE and 25 sheet automatic document feeder	$1643
UC-1260 (1200 DPI, 24 bit color, 8 bit grayscale,Photoshop full version)	CALL
UC-1200 (1200 DPI, 30 bit color, 24 bit color, 8 bit grayscale,Photoshop full version)	CALL

ScanOffice advantages over the HP ScanJet IIp include legal size, 600 DPI, upgradeable to color, Expervision's TypeReader, Microsoft Publisher, Picture Publisher LE, Windows Draw LE, and automatic background contrast adjustment (similar to Accupage) for improved OCR.

ScanOffice (OA-1 flatbed, legal size, 600DPI, 256 grays, TypeReader, MS Publisher)	$775
ScanOffice with 25-sheet automatic document feeder	$1176

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AAmazing Monitors	CALL
Cornerstone Dual Page 120 monitor only	1089
120 mono. card / 120 16 grey card	729 / 939
Dual Page 150 monitor only	1149
150 4 greyscale card	1039
Idek Monitors	CALL
MAG Innovision LX1460 1024x768 14"	399
PMV1448 1024x768 14"	385
MX14H 1280x1024 14"	488
LX1564 1280x1024 15"	499
MX15F 1280x1024 15"	589
MX17F 1280x1024 17"	1048
Nanao F340iw 15" / F550i 17"	729 / 1089
T560i 17"/F750i 21"/T660i 20"	1699/2089/2489
NEC Multisync 5FG 1280x1024 17"	1249
Multisync 6FG 1280x1024 21"	2299
Multisync 4FGE / Multisync 5FGE	709 / 1099
Radius PrecisionColor Pivot with card	1299
PrecisionColor 19	2195
PrecisionColor 20	2488
Portrait Display Labs Portrait / 15 Plus	CALL
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Multimode 120 1664x1200 19"	999
Multimode 150 2048x1536 19"	1375
Multimode 120 card / 150 card	775 / 845
Sony CPD-1604S 1024x768 17"	1039
GDM-2036S 1280x1024 20"	1989
Viewsonic Viewsonic 15 1024x768 15"	659
Viewsonic 17 1280x1024 17"	1239
Viewsonic 20 1600x1280 20"	1939
Viewsonic 21 1600x1280 21"	CALL

Graphic Cards

ATI Graphics Ultra Pro 1MB	329
Graphics Ultra Pro 2MB	359
Graphic Ultra Pro (EISA) 2MB	399
Graphic Ultra Pro (VL-Bus) 2MB	369
Graphics Ultra Plus 1MB	209
Graphics Ultra Plus 2MB	239
Diamond Stealth 24 1MB	169
Stealth 24 (VL-Bus) 1MB	169
Stealth Pro 1MB	239
Stealth Pro (VL-Bus) 1MB	249
Stealth Pro 2MB	349
Stealth Pro (VL-Bus) 2MB	349
Viper (VL-Bus) 2MB	409
Hercules Graphite 210 / GraphiteVLB	289/259
Graphite Pro / Graphite Pro VLB	399 / 399
Chrome C741 / Chrome C531	899 / 1148
Chrome C731	1299
Superstation	CALL
Dynamite VL	159
Matrox products	CALL
Number Nine #9 GXE Level 10 1MB	279
#9 GXE Level 11 2MB	389
#9 GXE Level 12 3MB	459
#9 GXI Level 29TC 4MB	1399
Orchid Fahrenheit 1280 + with 1MB	159
Fahrenheit VA with 1MB	169
Fahrenheit VA (VL-Bus) with 1MB	199
Celsius VLB with 1MB	249
P-9000 VLB with 3 MB	399
TrueVision Targa and other products	CALL
Video Seven WinVGA 1MB / WinPro	109 / 188

Video I/O Cards

Aitech ProPC / TV (ext. VGA to NTSC)	249
ProPC / TV Plus (ext. VGA to NTSC)	389
ProVGA / TV (VGA to NTSC)	579
ProVGA / TV Plus (VGA to NTSC)	699
ProPC / Video (display live video)	579
AudioShow (sound & video output)	578
AView Desktop TV	338
Cardinal SnapPlus Desktop Video	887
Creative Labs Video Blaster (capture card)	329
VideoSpigot for Windows	439
Digital Vision ComputerEyes RT/ Pro	289/295
TelevEyes (external box VGA to NTSC)	199
TelevEyes Pro (VGA to NTSC, genlock)	598
Hauppauge Win TV	CALL
IBM M-Motion (video capture)	1489
Intel Smart Video Recorder	529
InSync Technologies VGA Video Array	683
Jovian Logic SuperVIA (video capture)	492
VIN Plus (external box VGA to NTSC)	298
Magni Systems VGA Producer Pro	1688
Media Vision Pro Movie Studio	358
New Media WatchIt! TV (TV in a window)	299
SuperVideoWindows Board	CALL
VideoLogic Mediator (VGA to NTSC)	1688
DVA-4000/PC (SVGA capture)	1697
Visionetics VIGA 16 (Targa Clone)	998
Willow Publisher's Color (color capture)	648
Willow Laptop TV	CALL
TrueVision VideoVGA 16 (VGA to NTSC)	889
Bravado 16 (16 bit video capture)	1089
other Truevision products	CALL

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Hewlett Packard Lasers & Scanners

HP LaserJet 4 with 2MB	$1399	HP LaserJet 4M with 6MB	$1999
HP LaserJet 4 with 8MB	$1588	HP LaserJet 4M with 10MB	$2188
HP LaserJet 4 with 10MB	$1738	HP LaserJet 4M with 14MB	$2338
HP LaserJet 4 with 14MB	$1937	HP LaserJet 4M with 18MB	$2537
HP LaserJet 4 with 18MB	$2087	PostScript Level 2	$389
LJ4 Memory Upgrades:	1MB $79	2MB $159	4MB $399

HP LaserJet 4 with LaserJet 5 Upgrade	$2153	WinJet 1200 1200 DPI	$2153
HP LaserJet 4 with LaserJet 5 Upgrade	$2793	LaserPix 5.0 1200 DPI for Intel or Mac and text, 2400 DPI for photos, 256 grays, PostScript emulation.	$2793

HP LaserJet 4 Si	$3059	HP LaserJet 4 Si MX	$4799
HP PaintJet XL 300 2397	Deskjet 1200C 1499	Deskjet 1200C PS	1999
HP Scanjet IIc with interface and PhotoRedac 1349		HP Scanjet IIcx/ADF Adds Photoshop	1748
HP Scanjet IIp with interface and PhotoRedac 1199		Bundled with Adobe Photoshop	1198
HP LaserJet Fax (plus paper tend & rec.) 945		Laser Cassette Unit for HP / HP 168	168
HP IIIsi 10 EnvelopeFeeder/Large paper trays 59		AppleTalk Interface	239

TEXEL

New CD-ROM Drives!

The Texel CD-ROM drives offer 240ms access time, 336KB/sec transfer rate, 64 KB cache, SCSI-2 compliant, disc proof construction, self-cleaning lens mechanism, switch selectable SCSI ID, terminator, volume control, headphone jack, multi-session (XA) and CD-XA compatible.

DM-3028 Int. $399; with Interface $489;	w/ Pro Audio Spectrum 16 & custom cable $602
	w/ Pro Audio Studio 16 & custom cable $662
DM-3028 Ext. $449; with interface $579;	w/ Pro Audio Spectrum 16 & custom cable $722
	w/ Pro Audio Studio 16 & custom cable $782

MMB2 Bundle includes Pro Audio Spectrum 16, speakers, headphones, microphone, 2 CD caddies, Music audio control software, Compton's MPC Encyclopedia, Nautilus Multimedia Magazine, Music Sampler, Int'l. Jazz Sampler, Jazz Ext. Sampler, Jazz Ext. Sampler, Rolling Stones Parks - Multimedia Family Guide, MPC Wizard Tert & Tune-Up, Autodesk Multimedia Explorer, World View Media Clips, Kang's Quest V, Custom Sampling MPC and Beethoven's 5th. **Internal $899 External $999**

Mustek Scanners

"The images scanned from the Mustek Flatbed MFS 6000C were the best and most closely resembled the original artwork in contrast, detail and hue."
– Byte Magazine June 1992

Pricelessn 105 for notebook PCs, 400dpi, 64 gray, Pricetove OCR, for DOS	MAK105	$149
Mars 800GP 800dpi, 256 grays, Percetove OCR, for DOS	MAR800	$249
Mars 800GWP 800dpi, 256 grays, Percetove OCR, & Pro Pub 3.0 LE (Win)	MAR811	$469
Mustekar 105 400 dpi, 64 grays, Percetove Percetove OCR for DOS	MAR105	$149
ScanMagic 256 400 dpi, 256 grays, PhotoMagic LE, Percetove OCR (Win)	MAR202	$125
ScanMagic Color 400 dpi, 18 bit color, PhotoMagic LE, Percetove OCR (Win)	MAR203	$249
SS-4000 CCD Color Artist 18 bit color, Percetove OCR for DOS	MAR600	$295
SS-4000 CCD Color Artist 18 bit color, Pro OCR, & Pro Pub 3.0 LE (Win)	MAR601	$395
Color Artist Pro 36 bit color, Pro OCR, & Pro Pub 3.0 LE (Win)	MAR602	$379
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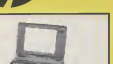

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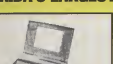

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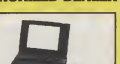

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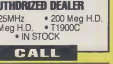

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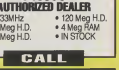

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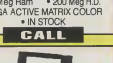

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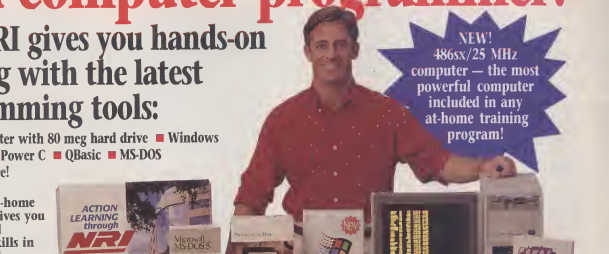

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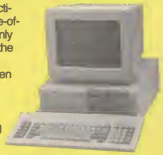

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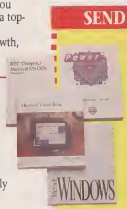

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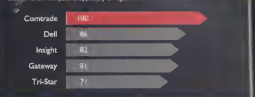
DOS Mark (Overall Performance)

Source: Review-Computer Shopper, July & August 1993



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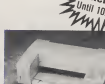

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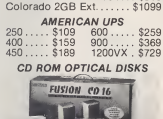

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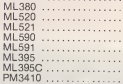

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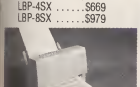

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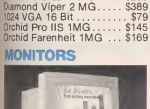

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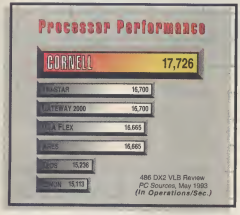

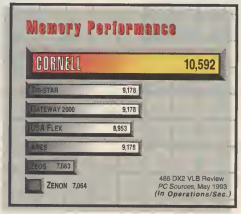

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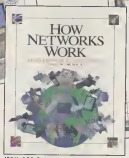

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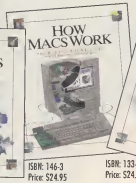

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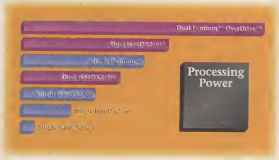

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- 1.2MB & 1.44MB Floppy Drive
- IDE 2HD/2FD Controller
- 2 Serial, 1 Parallel, 1 Game Ports
- 120MB 15MS Hard Drive
- 1MB 16-BIT SVGA Card
- 14" .28 SVGA Monitor
- Mini-Tower or Desktop Case
- Enhanced 101-Key Keyboard

486DX2-66 VLB $1,418
486DX-50 VLB ...1,348
486DX2-50 VLB ..1,318
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486SLC2-50 VLB .1,138
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486DX2-66 ISA...1,398
486DX-50 ISA 1,328
486DX2-50 ISA...1,298
486DX-40 ISA 1,218
486DX-33 ISA 1,198
486SX-33 ISA 1,088
486SX-25 ISA 1,008
486DLC-40 ISA...1.028
486DLC-33 ISA 988
386DX-40 ISA.....958

YOUR CHOICES

- 14" Non-Int SVGA Monitor ..... Add $30
- 15" Non-Int SVGA Monitor ..... Add 160
- 14" .39 SVGA Monitor ..... Less 30
- Window Accelerator 1MB ..... Add 20
- ATI Ultra 1MB ..... Add 140
- ATI Ultra Pro 2MB ..... Add 290
- 170MB Hard Drive ..... Add 30
- 200MB Hard Drive ..... Add 50
- 250MB Hard Drive ..... Add 80
- 340MB Hard Drive ..... Add 160
- Microsoft DOS 6.0 ..... Add 50
- 250MB Tape Back-up ..... Add 150
- Speaker Systems ..... Add 510
- Mitsumi CD-ROM (350MS) ..... Add 190
- Sound Blaster Pro Deluxe ..... Add 130
- Creative Labs Edutainment CD16 Upgrade Kit ..... Add 540

EISA (VLB) SCSI SYSTEMS

- Intel Pentium Technology Ready
- NICE EISA VLB Motherboard
- 128K Cache Expandable to 1MB
- 4MB RAM Expandable to 128MB
- 1.2MB & 1.44MB Floppy Drive
- 32 BIT EISA SCSI Controller
- 2 Serial, 1 Parallel, 1 Game Ports
- 200MB Fast SCSI Hard Drive
- Diamond Speed Star Pro VLB
- 14" Non-Int .28 SVGA Monitor
- Mini Tower or Desktop Case
- Enhanced 101-Key Keyboard
- Free Microsoft DDS 6.0
- Free Mouse & MS Windows

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486DX-50.....1,978
486DX2-50 1,928
486DX-33.....1,848

YOUR CHOICES

- 15" Non-Int .28 Monitor ..... Add $110
- 320MB SCSI Hard Drive ..... Add 380
- Diamond Viper VLB w/2MB ..... Add 270
- Texel CD-ROM 3024N (265MS) Add 370

EISA (VLB) WIN-STATIONS

- Intel Pentium Technology Ready
- NICE EISA VLB Motherboard
- 128K Cache Expandable to 1MB
- 4MB RAM Expandable to 128MB
- 1.2MB & 1.44MB Floppy Drive
- VESA Local Bus IDE Controller
- 2 Serial, 1 Parallel, 1 Game Ports
- 200MB Fast IDE Hard Drive
- Diamond Speed Star Pro VLB
- 14" Non-Int .28 SVGA Monitor
- Mini Tower or Desktop Case
- Enhanced 101-Key Keyboard
- Free Microsoft DDS 6.0
- Free Mouse & MS Windows

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486DX-50.....1,708
486DX2-50 1,658
486DX-33.....1,578

YOUR CHOICES

- 15" Non-Int .28 Monitor ..... Add $110
- 340MB IDE Hard Drive ..... Add 100
- ATI Ultra Pro VLB w/2MB ..... Add 230
- Mitsumi CD-ROM (350MS) ..... Add 190

VESA DELUXE SYSTEMS

- Intel Pentium Technology Ready
- 64K Cache Expandable to 256K
- 4MB RAM Expandable to 32MB
- 1.2MB Floppy Drive
- 1.44MB Floppy Drive
- VESA Local Bus IDE Controller
- 2 Serial, 1 Parallel, 1 Game Ports
- 120MB Fast IDE Hard Drive
- Diamond Speed Star Pro VLB
- 14" .28 SVGA Monitor
- Mini Tower or Desktop Case
- Enhanced 101-Key Keyboard
- Free Microsoft DDS 6.0
- Free Mouse & MS Windows

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486DX-50.....1,568
486DX2-50 1,518
486DX-33.....1,438

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- Orchid Fahrenheit VLB (S3-805) Add 40
- Mitsumi CD-ROM (350MS) ..... Add 190

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- Orchid or Diamond VLB M/B
- 256K High Speed Cache
- 4MB RAM Installed
- 1.2MB Floppy Drive
- 1.44MB Floppy Drive
- VESA Local Bus IDE Controller
- 2 Serial, 1 Parallel, 1 Game Ports
- 200MB Fast IDE Hard Drive
- Orchid or Diamond VLB w/1MB
- 14" NI .28 SVGA Monitor
- Mini Tower of Desktop Case
- Enhanced 101-Key Keyboard
- Free Microsoft DDS 6.0
- Free Mouse & MS Windows

Orchid / Diamond VLB
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486DX-50.....1,728
486DX-33.....1,598

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- Mitsumi CD-ROM (350MS) ..... Add 190
- 250MB Tape Back-up ..... Add 150

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- 4MB RAM Expandable to 32MB
- 1.2MB & 1.44MB Floppy Drive
- VLB IDE Controller w/2S/1P/1G
- 120MB Fast IDE Hard Drive
- Diamond Speed Star Pro VLB
- 14" Non-Int .28 SVGA Monitor
- Hi-Speed CD-ROM w/2 speakers
- Sound Blaster Pro Deluxe
- Mini Tower or Desktop Case
- Enhanced 101-Key Keyboard
- Free Microsoft DOS 6.0
- Free Mouse & MS Windows

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486DX-50.....1,828
486DX2-50 1,778
486DX-33.....1,698

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- Orchid Fahrenheit VLB (S3-805) Add 40
- 250MB Tape Back-up ..... Add 150

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- Intel Pentium Technology Ready
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- 8MB RAM Expandable to 32MB
- 1.2MB Floppy Driv
- 1.44MB Floppy Drive
- VESA Local Bus IDE Controller
- 2 Serial, 1 Parallel, 1 Game Ports
- 340MB Fast IDE Hard Drive
- Diamond Speed Star Pro VLB
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- Full Tower Case
- Enhanced 101-Key Keyboard
- Free Microsoft DDS 6.0
- Free Mouse & MS Windows

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Discovery CD 8 Upgrade Kit 469
Discovery CD 16 Upgrade Kit 536
Panasonic CD-ROM (SSCMS) 144
Sony CD-ROM 31A 189
Sony CD-ROM 31A
MODEM (SCSI) Internal 268
MODEM (SCSI) External 446
Inter SCSI Host w/Driver 78

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Jetfighter Star for Windows 48
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Lands of the World Atlas 28
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Lincoln's Encyclopedia MPC 28
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Lyrics Pack V1 DOS 28
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Lyrics Power Quest MPC 24
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Lyrics Voyager Adventure 28
Lyrics Choice/Brainiacs DOS 28
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Lyrics Education Collections DOS 28
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Lyrics Chess Vol 2 DOS 28
Lyrics Books Out of Records MPC 28
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Lyrics Experimental Fighter 28
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Lyrics Teaches Typing MPC 20
Lyrics Clinic Family Health 20
Lyrics Class - 4 Pk MPC/MAC 44
Lyrics Microsoft Bookshelf MPC 50
Lyrics Movies MPC 20
Lyrics MS Music Shop 20
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Lyrics National Geographic Mammals DOS 28
Lyrics Spell Pk 28
Lyrics Digital Imagery VI DOS 24
Lyrics Film ED DOS 28
Lyrics Film ED 28
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Lyrics Learning Language (German) 28
Lyrics Learning Language (Japanese) 28
Lyrics Learning Language (Spanish) 28
Lyrics Jets DOS 28
Lyrics Jets 1.0 CD 28

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Wild Places DOS 18
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World View DOS 15

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IDE with I/O for VESA Local Bus 38
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1542CX w/Kit (SCSI) 248
1542C- w/ASW 500 (SCSI) 308
1742A EISA (SCSI) 468
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Mitsumi 101-Key Enhanced 20
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OMNI 101 Nl 70
OMNI 102 70
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387SX-25 56

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Fax Modem (9600 Fax/2400 Modem) 46
Fax Modem (14,400 Fax/14,400Modem) 140
Pocket Fax Modem Send & Receive 218
Hayes
Accura 14400 Fax Modem Int 238
Accura 14400 Fax Modem Ext 258
Optima 14400 Fax Modem 388
US Robotics
Sportster 9600 Modem Int 148
Sportster 14400 Modem Int 168
Sportster 14400 Modem Ext 188
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14' Super VGA 1024*768 28 NI 288
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MX17F 17' 1280*1024 28 NI 738
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5s 14' 1024*768 28 NI 478
6F 14' 1024*768 28 NI 718
7 17' 1280*1024 28 NI 928
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386SX-40 128
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486SX-33/128K EISA 258
486DLC-40/64K EISA 158
486DLC-40/64K EISA 198
486DLC-33/64K EISA 278
486DX2-50/128K EISA 468
486DX-33/128K EISA 518
486DX2-66/128K EISA 588
486DX-33/128K EISA 498
486DX-50/128K EISA 568
486DX2-66/128K EISA 708
486SLC2-50/64K Local Bus 318
486SLC2-66/64K Local Bus 378
486DX-33/64K Local Bus 398
486DX2-50/64K Local Bus 488
486DX-50/64K Local Bus 568
486DX2-66/64K Local Bus 598

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3-Button Microsoft Compatible $12
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Mouseman Serial/Bus 58
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16 Bit Ethernet Cards (Pocket for Notebook) 148
16 Bit Ethernet (NE2000 Compatible) 68
ANSEL
P-NE3000-BA 10 Base-2 & AUI 68
P-NE3000-TA 10 Base-T & AUI 98
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P-NET-NR2900 Hub
w/10 Base-T, 1-10Base-2, 1-10Base-5 278
ARCnet
4-Port Passive Hub 15
8-Port Active Hub 118
Bus Topology 8 BIT ISA Card 46
Bus Topology 16 BIT ISA Card 58
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BoomROM
8 BIT Auto Boot PROM 15
16 BIT Auto Boot PROM 15
Hubs and Repeaters
4-Port Base T HUB 148
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12-Port 10 Base T HUB 438
Daughter Card: Additional RJ45 Ports 68
Daughter Card: BNC/AUI Ports 58
2 BNC Ethernet Repeater 198

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Color Option for Citizen Printers 48/68
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KX-P1123 (24-Pin) 188
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KX-P1180 (9-Pin) 138
KX-P2023 (24-Pin) Quiet 198
KX-P2123 (24-Pin) Color Capacity 238
KX-P2124 (24-Pin) Color Capacity 328
KX-P2624 (24-Pin) Quiet Wide 378
Color Upgrade for KX-PCK11 48

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Colorado
QJ-10 Tape Back-up 120MB 148
DJ-20 Tape Back-up 250MB 194
KE-8 Tape for DJ-10/DJ-20 84
Tape DIC-80 3M QC2120 22
JT-10 Trakker 120MB Ext 298
JT-20 Trakker 250MB Ext 368
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Graphics Ultra Pro 2MB (VLB) 348
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- Pinpoints the optimum driver for your VGA card
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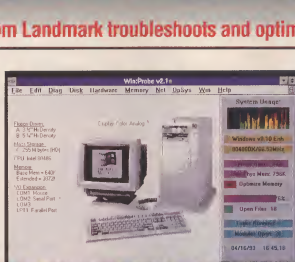
- Analyzes and suggests the best Windows setup for your system



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Few things are more aggravating than computer downtime and lockups. You waste time waiting for help and usually pay a dear price to get it when you finally do. Your time is valuable, so let **WINProbe** troubleshoot the problem for you. You'll be able to quickly identify the source of the problem; hardware, software, or configuration. Telephone support time is slashed. Repair bills drop like a rock (50% and more of your repair bills are for diagnosing the problem, **WINProbe** does it for you at NO COST!). Tests include...

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- Memory allocation and management
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WINProbe requires an IBM AT, 386, 486, PS/2 or compatible with at least 1MB of RAM, DOS 3.1 or higher, Windows 3.0 or higher, and either a Hercules mono, EGA, VGA, or SVGA video. A mouse is recommended but not required.

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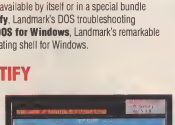

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Circle 189 on reader service card.

THE CHOICE

What system is the fastest? The most reliable? What kind of service am I getting? Just how do I make the right

MultiMedia

100% MPC Compliance For 100% Media Enjoyment.

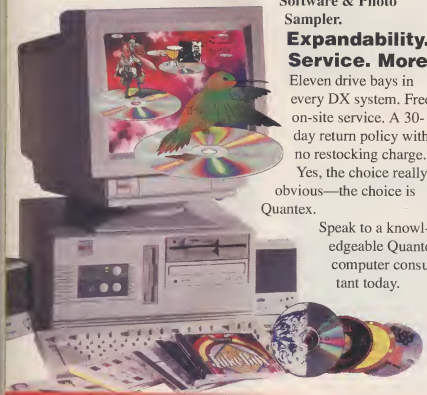
CD-ROM technology can now bring your computer to life with breathtaking sound, color and video.

Quantex offers lightning-fast 32-bit local bus video, 16.7 million true colors plus a 16-bit Sound Blaster Pro™ compatible card with digital-ready speakers.

What's more, our system is Kodak photo CD compatible and complies 100% with today's MPC standard.

Six CD-Titles. $1500 value.

Ever wonder why Penguins can't fly? Want to teach your children how to count? How about flying a F-14 Tomcat on a do-or-die mission? Get all this and more with the six CD-ROM titles included in every Multimedia system: **Dictionary of the Living World, Compton's Family Choice, Software Jukebox, Compton's Interactive Encyclopedia, USA Today: *The 90's Volume*, and Kodak Photo-CD Access Software & Photo Sampler.**



Expandability. Service. More.

Eleven drive bays in every DX system. Free on-site service. A 30-day return policy with no restocking charge. Yes, the choice really is obvious—the choice is Quantex.

Speak to a knowledgeable Quantex computer consultant today.

Multimedia VESA Systems

Q486SX/25MM $1595

- **Kodak™ Photo CD compatible High performance CD-ROM drive**
- **SoundBlaster Pro™ compatible audio card**
- **Digital ready amplified stereo speakers**
- **Six CD-ROM titles**
- Intel 486™SX-25 MHz upgradable CPU
- 4MB RAM expandable to 32MB
- 255MB Western Digital™ hard drive
- 32-bit VL-BUS graphics card
- 14" 1024x768 non-interlaced monitor
- 1.2MB and 1.44MB floppy drives
- Baby AT desktop case
- 101 Key enhanced keyboard
- High resolution mouse
- Microsoft DOS 6.0 and Windows 3.1
- Same Day shipping available

Q486DX/33MM	**$1895**
Q486DX2/50MM	**$1945**
Q486DX2/66MM	**$2095**

Q486DX/33MM $2295

- **Kodak™ Photo CD compatible High performance CD-ROM drive**
- **SoundBlaster Pro™ compatible audio card**
- **Digital ready amplified stereo speakers**
- **Six CD-ROM titles**
- Intel 486™DX-33 MHz upgradable CPU
- 8MB RAM expandable to 32MB
- 256K ultra-fast cache
- 255MB Western Digital™ hard drive with
- 32-bit VL-BUS graphics card
- 15" flat screen 1024x768 color monitor
- 1.2MB and 1.44MB floppy drives
- 11 bay tower case
- 101 Key enhanced keyboard
- High resolution mouse
- Microsoft DOS 6.0 and Windows 3.1

Q486SX/25MM	**$1995**
Q486DX2/50MM	**$2345**
Q486DX2/66MM	**$2495**

All Systems Include:

- One-Year Warranty On Parts & Labor
- Express Parts Replacement
- One-Year On-Site Service
- Lifetime Toll-Free Tech Support
- 30-Day Money Back Guarantee

QUANTEX Microsystems, Inc.

Two Tower Center Blvd., East Brunswick, NJ 08816, Tel: (908) 563-4166, Fax: (908) 563-0407

Quantex accepts prepaid checks, Visa, MasterCard, Discover, and Amex. Purchase orders from government agencies, universities, and Fortune 1000 companies also accepted. On-Site Service may not be available in certain remote areas. All returned items must have a Return Merchandise Authorization (RMA) number and must be in original packaging. The cost for returned freight is not included with any Money-Back

IS OBVIOUS

decision? We say look at the facts. Because once you look at the facts your choice will be obvious. Quantex.

Windows Workstations

Not Just VESA. But Dual VESA.

While most companies give you local bus video alone, Quantex gives you VESA local bus video plus local bus IDE. And because VESA local bus is now an industry standard, compatibility issues are eliminated. Future upgrades are no longer a problem.

Local Bus Video. 800% faster than ISA.

32-bit local bus video means the end of the 16-bit bottleneck. So you get speeds up to 800% faster. And our local bus video is *true color* video. So forget about 32,000 colors, and get ready for a new world of 16.7 million colors!

Local Bus IDE. Put Your Hard Drive in OverDrive.

Our local bus controller can do for your hard drive speed what our local bus video can do for your video. The driving force is a true 32-bit local bus IDE interface. You'll get lightening-fast data transfer rates with maximum bursts of 8.3 MB/sec.

intel inside

A cut above the rest... Caviar WESTERN DIGITAL

MICROVES Microsystems VISA

Windows Workstations

Q486DX/33VLB $1545

- **32-bit VL-BUS IDE controller**
- **32-bit VL-BUS graphics accelerator card with 1MB supports 16.7 million colors**
- Intel 486™DX-33 MHz upgradable CPU
- 4MB RAM expandable to 32MB
- 256K ultra-fast cache
- 255MB Western Digital™ hard drive
- 14" 1024x768 non-interlaced color monitor with edge-to-edge display and .28mm dot pitch
- 1.2MB and 1.44MB floppy drives
- 2 serial, 1 parallel, 1 game port
- 11 bay tower case
- 101 Key enhanced keyboard
- High resolution mouse
- Microsoft DOS 6.0 and Windows 3.1
- Same Day shipping available

Q486SX/25/VLB $1295
Q486DX2/50VLB $1595
Q486DX2/66VLB $1745

Q486DX2/66VLB $2095

- **32-bit VL-BUS IDE controller**
- **32-bit VL-BUS graphics accelerator card with 1MB supports 16.7 million colors**
- Intel 486™DX2-66MHz CPU
- 8MB RAM expandable to 32MB
- 256K ultra-fast cache
- 255MB Western Digital™ hard drive
- 15" flat screen 1024x768 color monitor
- 1.2MB and 1.44MB floppy drives
- 2 serial, 1 parallel, 1 game port
- 11 bay tower case
- 101 Key enhanced keyboard
- High resolution mouse
- Microsoft DOS 6.0 and Windows 3.1
- Same Day shipping available

Q486DX/33VLB $1895
Q486SX/25VLB $1645
Q486DX2/50VLB $1945

All Systems Include:

- One-Year Warranty On Parts & Labor
- Express Parts Replacement
- One Year On-Site Service
- Lifetime Toll-Free Tech Support
- 30-Day Money Back Guarantee

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Circle 222 on reader service card.

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MEGAHAUS HARD DRIVES

Customer Advantage

- Unequaled Reputation
  Nobody knows drives like Megahaus. We have specialized in high quality storage solutions for over six years. Referals from satisfied customers is a high percentage of our business.

- Same Day Shipping
  Our multi-million dollar inventory offers you the best diversity and availability in the market. We ship most of our orders within 24 hours.

- Direct Replacement Warranty
  During the first year of your warranty we replace ; not repair, your drive. Many of our competitors send your drive to the manufacture for repair, and you are without your drive for weeks. Our direct replacement warranty allows us to offer you a 24 hour turn around time.

- Lifetime Technical Support
  Our friendly factory trained technitions will support our products forever.

- Longevity
  During our six years in business we have seen many competitors come and go. Many have gone out of business due to poor and dishonest business practices. MegaHaus is a secure, honest company that will be here to service you for many, many more years to come.

- Fast, Easy Installation
  Most of our competitors do not add any value to the products that they sell. They get it in one door and ship it out the other door. The documentation included with their products is poor or not included at all. You are left to spend countless hours and headaches trying to get their products to work.
  MegaHaus does all the work for you. We spend endless hours researching the best possible solutions. When we have determinined the best drives, controlers, and software for each of our kits we put together our own precise quick installation guide. A short, to the point manual, not a 2" thick confusing manufactures manual. This quick installaion guide gives you the fastest, easiest installation available.

Thank you for your business!

Maxtor

Maxtor Drives feature the "No Quible Service Plan". If your drive fails under warranty they will ship you an advanced replacement drive. The MXT540 and MXT1240 are among the fastest drives made. With over 8 million drives sold, the M7000 series is one of the most reliable and most popular drives made.

IDE					
245MB	15ms	3600rpm	64K	M7245A*	$233
345MB	14ms	3600rpm	64K	M7345A*	$315
540MB	8.5ms	6300rpm	64K	MXT540A***	$999
SCSI					
245MB	15ms	3600rpm	64K	M7245S**	$266
340MB	14ms	3600rpm	64K	M7345S**	$346
545MB	8.5ms	6300rpm	256K	MXT540SL***	$769
1240MB	8.5ms	6300rpm	256K	MXT1240S***	$1149

Warranty * 1 year ** 2 year *** 3 year

Maxtor
Drives a Hard Bargain

Quantum™

Quantum 170, 240, & 525 feature a two year renewable warranty. If your drive fails within two years it will be replaced with a drive that has an additional two year warranty. 1050 and 1225 models feature a five year warranty. Quantum is an incredible drive at a great price!

IDE					
170MB	17ms	3600rpm	32K	ELS170A	$192
240MB	16ms	4300rpm	256K	LPS240A	$259
525MB	10ms	4500rpm	512K	LPS525A	$626
SCSI					
170MB	17ms	3600rpm	32K	ELS170S	$195
240MB	16ms	4300rpm	256K	LPS240S	$264
525MB	10ms	4500rpm	512K	LPS525S	$626
1050MB	10ms	4500rpm	512K	PRO1050S	$916
1225MB	10ms	4500rpm	512K	PRO1225S	$1027

Specify Quality
Specify Performance
Specify Quantum

WESTERN DIGITAL

Western Digital drives feature a three year warranty, The innovative Caviar drive models feature lightning fast seek times of less than 13ms, Cacheflow2 read and write disk caching for great performance, and 250,000 hours MTBF which means years of worry-free performance.

IDE					
212MB	13ms	3600rpm	64K	AC2200	$214
256MB	12ms	3322rpm	64K	AC2250	$241
341MB	12ms	3322rpm	64K	AC2340	$312
425MB	12ms	3322rpm	128K	AC2420	$451

Necessarily The Fastest™
Caviar

CONNER

High quality has made Conner the drive of choice of most major manufactures such as Dell and Compaq. Conner is "The Storage Answer" with a full line of storage products including tape drives and hard drives. 340 & 1371MB feature a 2 year warranty.

IDE						SCSI				
250MB	14ms	4542rpm	32K	$234		340MB	13ms	4500rpm	32K	$334
340MB	13ms	4500rpm	32K	$334		540MB	10ms	5400rpm	256K	$683
540MB	10ms	5400rpm	256K	$665		1371MB	10ms	5400rpm	256K	$989

Ontrack

Computer Systems

Brings IDE Drive Owners an Amazing New Product! Drive Rocket IDE Drive Accelerator.

Drive Rocket software increases the data transfer rate of your drive 30 to 80%. We highly recomend this software for Maxtor, Quantum, Conner, Micropolis, and Fujitsu IDE hard drives. Installation is a snap. Performace benchmark utilities are included to show performance gains. Toll free support. Drive Rocket is a device driver that requires 3K of memory. *Try it, you will like it!*

Only $29
with any drive purchase

$39
purchased separately

Support, & Courtesy! Drive Company!

MICROPOLIS®

Micropolis drives feature a five year advanced replacement warranty. If your drive fails within the warranty period they will ship you an advanced replacement. Since 1976 Micropolis has been a leading supplier of high-performance, high-capacity disk drives. Micropolis is a leader in cutting edge technology!

IDE					
560MB	10ms	5400rpm	256K	MC2205A	$739
1050MB	10ms	5400rpm	256K	MC2210A	$925
1740MB	10ms	5400rpm	256K	MC2217A	$1359
SCSI					
560MB	10ms	5400rpm	256K	MC2205	$739
1050MB	10ms	5400rpm	256K	MC2210	$925
1740MB	10ms	5400rpm	256K	MC2217	$1359
2100MB	11ms	5400rpm	256K	MC1926	$1789
3020MB	11ms	5400rpm	256K	MC1936	$2259

FUJITSU

Fujitsu drives feature a five year warranty. These Japanese made drives are extremely dependable. Fujitsu is the world's second largest computer company. You can depend on Fujitsu!

IDE					
520MB	12ms	4400rpm	256K	M2624T	$659
SCSI					
520MB	12ms	4400rpm	256K	M2624F	$659
1080MB	9.5ms	5400rpm	256K	M2694ESA	$939
2060MB	12ms	5400rpm	256K	M2654ESA	$1849

DEC

Five year warranty

1600MB	9.7ms	5400rpm	512K	DSP3160	$1159

IBM PS/1 & PS/2 DRIVES

Nobody knows PS/1 and PS/2 upgrades better than MegaHaus. Each kit is complete with everything you will need. IBM recommends and buys from MegaHaus, shouldn't you.

Capacity	PS/1 386 & 486	PS/2 25, 30, 30-286	PS/2 35 & 40	PS/2 50 thru 95
170MB	$239	$299	$229	$379
240MB	$309	$389	$299	$459
340MB	$389	$479	$379	$559
525MB	$739	$799	$729	$889
1050MB	n/a	$1159	n/a	$1229

120MB for PS/1 286 $589

HARD DISK CARDS

Hard drive and controller assembled as one unit. Saves a drive bay. Super easy installation. Requires only one card slot. Compatible with XT & AT compatibles, PS/2 30, and Tandy.

42MB	$199	210MB	$319	340MB	$439
170MB	$269	240MB	$339	525MB	$779

MegaHaus is a solution oriented company. We offer complete internal or external solutions for XT, AT ,PS/1, PS/2, Local Bus, EISA, MicroChannel, Macintosh, Sun, Printer Port, Tandy & others.

CONTROLLERS

Complete your drive purchase with one of these high quality controllers.

MODEL	Without Drive	With Drive
IDE		
MegaHaus		
8Bit ADP-50	$55	$40
16Bit IDE8DCT (2 hard drive, 2 floppy)	$29	$15
16Bit SUPERIO (2 hard, 2 floppy, 2 serial, 1 parallel)	$39	$22
Local Bus (4 hard, 2 floppy, 2 serial, 1 parallel)	$75	$62
DTC		
EISA 2290 (4 hard, 4 floppy)	$175	$159
SCSI		
Future Domain		
We recommend future Domain SCSI controllers for superior quality performance, compatibility		
8Bit 850MCD (Hard Drive, CD ROM)	$79	$65
16Bit 1680SVP (2 Floppy, Hard Drive, CD ROM)	$155	$139
16Bit 1680CRL (2 Floppy, Hard Drive, CD ROM, Optical, Tape)	$209	$195
Adaptec		
16Bit 1522 (2 floppy, Hard Drive)	$99	$89
16Bit 1542C (2 floppy, Hard Drive)	$225	$210
16Bit 1542CKIT (2 floppy, Hard Drive, CD ROM)	$275	$259
16Bit 1542CKIT+ (2 floppy, Hard Drive, CD ROM, Optical, Tape)	$345	$339
EISA 1742KIT (2 floppy, Hard Drive, CD ROM)	$449	$429
Bus Logic		
16Bit BL545KIT (2 floppy, Hard Drive)	$245	$235
Local Bus BL445KIT (2 floppy, Hard Drive)	$320	$305
EISA BL747KIT (2 floppy, Hard Drive)	$390	$375
Trantor		
8Bit T130	$79	$65
Printer Port T348 (both support Hard drive, CD ROM,Optical, Tape)	$189	$179

MEGA HAUS HARD DRIVES

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Houston, Texas 77058
FAX 1-713-333-3024

1-800-786-1185

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We Know Tape, CD,
Professional Solutions!

TAPE DRIVES

CONNER

250MB QIC-80 TAPE BACKUP
Conner QIC-80 Tape drives. Compatible with all other QIC-80 format tape drives. Gives 250MB capacity with a DC2120 tape. Toll free technical support. Includes backup software, all necessary cables, and 1 tape.

Internal
Mounts in 5 1/4" or 3 1/2" drive bay. Runs off your floppy controller. Includes third floppy drive cable and backup software.
$181 with 1 free tape
$173 with hard drive purchase

External for Printer Port
Runs off any standard parallel printer po
External connector allows you to run pri
and tape drive at the same time. Perfect
backing up notebook or multiple compute
Very small size only 1 1/2" x 6" x 8 1/2"
$345 with 1 free tape

HIGH CAPACITY SCSI TAPE BACKUP
MegaHaus uses only the best components available for our SCSI tape drive kits. Your satisfaction is guaranteed. Kits feature:
- Future Domain TMC1680SVP 16bit controller
- Includes 1 tape, cables, mounting hardware, and manuals.
- Nova Back backup software (features unattended backup, mouse support, fast and easy operation)

Prices listed are with DOS / Windows backup software. Call for OS/2, Novell, UNIX, XENIX, and Macintosh prices.

Capacity Standard	Capacity Compressed	Brand	Max. Speed	Type	Model	Bare	16Bit Kit
250MB	n/a	Conner	6MB/min	DC6000	C2150S	$359	$579
525MB	n/a	Conner	14MB/min	DC6000	C2525S	$509	$719
2GB	n/a	Conner	22MB/min	DAT	C4320RT	$899	$1039
2GB	n/a	Hewlett Packard	12MB/min	DAT	HP35470	$939	$1159
2.5GB	5GB	Exabyte	15MB/min	8mm	8205	$1449	$1699
4GB	8GB	Hewlett Packard	42MB/min	DAT	HP35480	$1079	$1299
4GB	16GB	Hewlett Packard	130MB/min	DAT	C1533A	$1699	$1929
4GB	8GB	Conner	88MB/min	DAT	C4324RT	$1119	$1329
5GB	5GB	Exabyte	30MB/min	8mm	8500	$2349	$2619
5GB	10GB	Exabyte	60MB/min	8mm	8505	$2259	$2519

Compressed capacity is with maximum compression. The amount of compression depends on your application.

REMOVABLE DRIVES

SyQuest

High performance removable cartridge hard disk drive. Offers solutions such as unlimited capacity, data transportibility, data security, & fast backup just to name a few. 44 and 88MB drives feature 20ms, 105MB features 16.5ms. Kits include 1 cartridge.

SCSI Capacity	Model	Form	Bare	16Bit Kit
44MB	SQ555	5 1/4"	$275	$429
88MB	SQ5110	5 1/4"	$315	$499
44 or 88MB	SQ5110C	5 1/4"	$349	$519
105MB	SQ310SS	3 1/2"	$509	$689
IDE				
105MB	SQ310SA	3 1/2"	$419	$499

New! External 105MB IDE for your printer port. Attaches to any standard parallel printer port. Only 8" x 4 1/4" x 1 3/4" $579 with one cartridge.

Kalok CORPORATION

Kalok redefines removability. How? With the wonderful, new K-Stor removable hard disk drive. An extremely high quality (we are really impressed with the quality of this product!) removable hard drive. Great for taking data from one location to the next, and endless other uses. Features 100 G's non-operating shock, IDE/AT interface, 16.5ms, & a 2 year warranty!

250MB drive	$389
360MB drive	$489
500MB drive	$789
Docking module	$89
Carrying case	$20

Multiple drive docking modules coming soon.

MEDIA

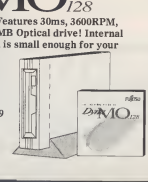
	Quantity 1	5
Verbatim Tapes		
DC2120	$17.5	$15.8
DC6250	$26	$24
DC6525	$31	$28
DAT 90M	$17	$15
8mm 112M	$16	$13
SyQuest Media		
44MB	$66	$64
88MB	$99	$96
105MB	$65	$61
Optical Media		
128MB	$42	$38
650MB	$109	$99
650MB WORM	$149	$145
1GB	$189	$179
1.3GB	$159	$149
1.3GB WORM	$179	$169

OPTICAL DRIVES

FUJITSU DynaMO 128

The Worlds Fastest 128MB Optical drive! Features 30ms, 3600RPM, and 256K buffer. The Worlds Smallest 128MB Optical drive! Internal will mount in 3 1/2" x 1" drive bay. External is small enough for your briefcase only 5.1" x 8.2" x 1.4".

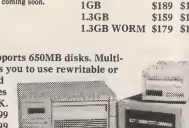
Internal Bare	$859
Internal with controller and 4 disks	$979
DynaMO External with 1 disk	$969
DynaMO PC External with controller and 1 disk	$1049
DynaMO MAC External with MacIntosh driver software and 1 disk.	$989



Hewlett Packard

HP1716T. 1.3GB also supports 650MB disks. Multi-function operation allows you to use rewritable or WORM (Write Once Read Many) cartridges. Features 23.5ms, 3600RPM, & 512K.

Bare Drive	$2799
Bare External	$2999
Internal 16Bit Kit	$3099



Maxoptix

Tahiti 3! 1.3GB also runs 650MB & 1GB disks. 19ms, Multifunction operation allows you to use rewritable or WORM (Write Once Read Many) cartridges. Features 4800RPM, 2.2MB/s maximum sustained read, 1.1MB/s maximum sustained write, SCSI-2 Interface.

Bare External Drive	1MB Cache $3199	4MB Cache $3349	
External 16Bit Kit	1MB Cache $3479	4MB Cache $3629	

Optical & Removable!

Guaranteed Satisfaction!

CD ROM DRIVES

In Touch with Tomorrow

TOSHIBA

Our CD ROM drives include a Photo CD processing coupon from ADI worth $35. Kodak Photo CD Access software is only $29 with any CD drive.

XM-3401 is the fastest CD ROM drive made. It features a SCSI-2 interface, 200ms access time, 256K buffer, and 330KB/sec data transfer rate. Unparalleled speed and reliability set the 3401 CD ROM apart from the competition. Additional Features include fully integrated audio, MPC compliance and Multi-Session Kodak Photo CD support. Toshiba meets today's demanding requirements for CD ROM applications.

Bare Drive	$449
Bare Drive in external enclosure	$559
Internal 16Bit Kit	$579

TEAC

The company you have come to trust for high quality floppy drives has now introduced an incredible CD ROM drive. The CD-50 features a SCSI-2 Interface, 265ms access time, 64K Buffer, and a 335KB/sec data transfer rate. The drive is also compatible with Kodak Multi-Session Photo CD, MPC, & XA formats.

Bare Drive	$339
Bare Drive in external enclosure	$425
Internal 16Bit Kit	$459

PIONEER

CD ROM Changers allow you to have 6 disks online at one time. No more switching disks. Perfect for schools, bulletin boards etc.

DRM-600A features 600ms access time and 153KB/sec data transfer rate

Bare Drive in external enclosure	$839
External 16Bit kit	$969

DRM-604X features 300ms access time and 612KB/sec data transfer rate. The drive is also MPC , CD XA, & Kodak Photo CD Compatible.

Bare drive in external enclosure	$1219
External 16Bit kit	$1379

CD ROM ACCESSORIES

		Alone	w/ Drive
Sound Cards			
MEDIA VISION	Pro Audio Spectrum 16 with SCSI interface	$179	$164
	Pro Studio 16 with SCSI interface	$215	$200
	(We sell only full retail kits, if you see a lower price it may be an OEM card.)		
Speakers			
SONY	SRS-88PC pair of white shielded speakers 3 watts/channel, excellent sound quality	$97	$89
	SRS-D2K shielded 3 piece system with sub woofer, 20 watt total	$159	$145
ALTEC LANSING	ACS-100 pair of white amplified speakers	$145	$130
	ACS-300 Incredible pair with subwoofer	$285	$275
Loading Devices			
	High Quality Caddies Qty 1/10	$10/9	$5/4
	Pioneer 6 Disk Magazine	$29	$20

MULTIMEDIA KITS

Mega MultiMedia Kits

MegaHaus brand kits feature SCSI interface, double speed drives. Each kit includes a Media Vision 16Bit sound card, Media Vision SCSI CD ROM software drivers, & all necessary data and audio cables. We use the full retail package of the Media Vision cards. Many of our competitors use an OEM version that is missing many of the valuable software programs.

TOSHIBA

XM3401, 200ms, 330KB/sec, & 256K buffer

Kit with Pro Audio 16	Internal	$629
	External	$769
Kit with Pro Studio 16	Internal	$669
	External	$809

TEAC

CD-50, 265ms, 335KB/sec, & 64K buffer

Kit with Pro Audio 16	Internal	$519
	External	$609
Kit with Pro Studio 16	Internal	$559
	External	$649

MEDIA VISION

Media Vision Multi-media kits feature NEC Multi-Spin CD Drives.

Fusion Double 16 350ms, Pro Audio 16, Labtech speakers and several CD titles	$599
PRO16 II upgrade 250ms, Pro Studio 16, microphone and several CD titles	$879
CDPC XL 280ms, external drive, speakers, and serveral CD titles	$979

CD ROM SOFTWARE

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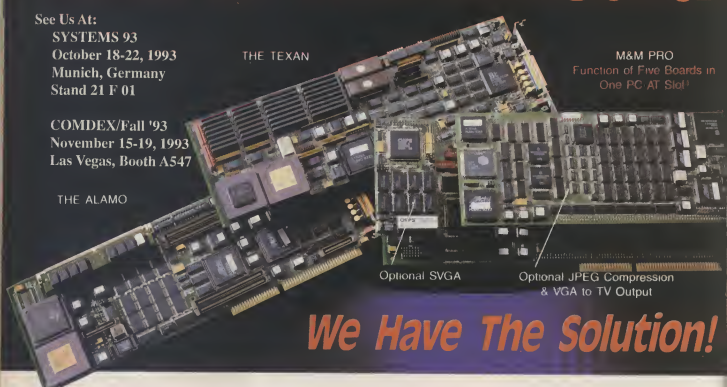

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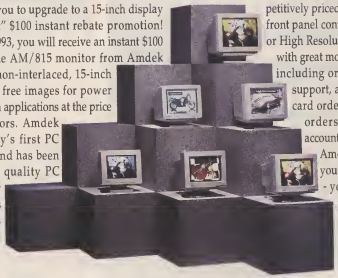

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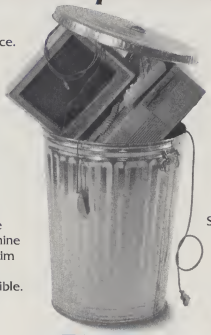

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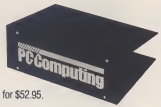

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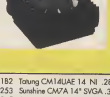

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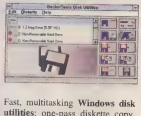

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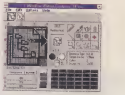

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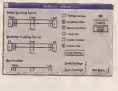

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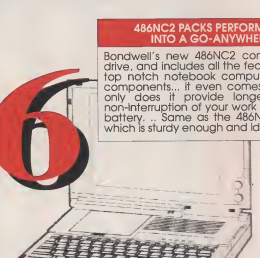

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486DX-50/128C VLB	518	688	888	1,028	1,068	1,088	1,298	1,318	1,338	1,368	1,438
486DX-33/128C VLB	378	548	748	888	928	948	1,158	1,178	1,198	1,228	1,298
486DX2-66/128C EISA	638	808	1,008	1,148	1,188	1,208	1,418	1,438	1,458	1,488	1,558
486DX-50/128C EISA	568	738	938	1,078	1,118	1,138	1,348	1,368	1,388	1,418	1,488
486DX-33/128C EISA	438	608	808	948	988	1,008	1,218	1,238	1,258	1,288	1,358
486DX2-66C EISA	528	698	898	1,038	1,078	1,098	1,308	1,328	1,348	1,378	1,448
486DX-50C ISA	498	668	868	1,008	1,048	1,068	1,278	1,298	1,318	1,348	1,418
486DX2-50C ISA	408	578	778	918	958	978	1,188	1,208	1,228	1,258	1,328
486DX-33C ISA	328	498	698	838	878	898	1,108	1,128	1,148	1,178	1,248
486DLC-40C ISA	188	358	558	698	738	758	968	988	1,008	1,038	1,108
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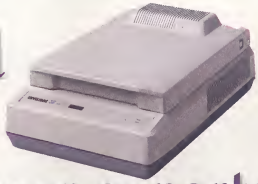

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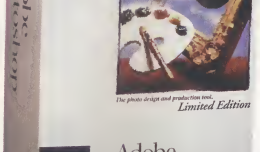

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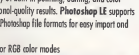

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ENV8100	800 dpi/1600 dpi	EST30238	$1249	$1099
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In speed and accuracy tests against six top brands, "the (ENV6100) read and processed each page with zero errors." —PC Sources 4/92 The ENV6100 contains the same scanner engine as the UMAX630, used in this test.

With **TextBridge** on the **ENV6100**, you can scan and recognize text this size (8 points) with near 100% accuracy!

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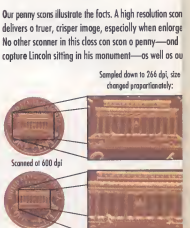
Our penny scans illustrate the facts. A high resolution scan delivers a truer, crisper image, especially when enlarged. No other scanner in this class can scan a penny—and capture Lincoln sitting in his monument—as well as our

Sampled down to 266 dpi, size changed proportionately:



Scanned at 600 dpi

Scanned at 800 dpi

Scanned at 1200 dpi

TWAIN Compatibility

This ad was created using scanned images from ENVISIONS scanners! The images were scanned into Photoshop™ 2.5 at 200 dpi, saved as EPS files, and placed into QuarkXPress™ page layout software.

ENVISIONS flatbed scanners and bundled software require hard disk space, ISA slot for interface card, PS/2 MCA

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Shopping Hand Scanners?

ENVISIONS' Bundles are More Logical Than Logitech™

By Far!

When compared against eight other hand scanners, including the ScanMan Model 256, "The ENV256 is a bargain."—PC Computing 7/92

Let's be reasonable. Both ENVISIONS and Logitech offer terrific hand-held scanners with premium software to scan text and graphics. They both can scan full pages using automerge technology. Then why does Logitech make you pay so much more? We can't figure it out either. It's *not logical!*

Grayscale

ENV256 Grayscale Scanner and Software Bundle!

ENV256 Scanner, HALO Desktop Imager, Perceive Personal OCR, Clip Art Library, ScanPod

Total Value $557

$179 On Sale! Was $199

EST4530B

Color

ENVColor Scanner and Software Bundle!

ENVColor Scanner, HALO Desktop Imager, Perceive Personal OCR, Clip Art Library, ScanPod

Total Value $074

$279 On Sale! Was $299

EST4455B

Features and Bundled Items:	ENVISIONS ENV256™	Logitech ScanMan™256	ENVISIONS ENVColor™	Logitech ScanMan™Color
Resolution	Up to 400 dpi	Up to 400 dpi	Grayscale: 400 dpi Color: 200 dpi	Grayscale: 400 dpi Color: 400 dpi
Grayscales/Color Capability	256 Grayscales	256 Grayscales	262,144 Colors	16,800,000 Colors
Automerge/AutoStitch	✓	✓	✓	✓
Image Editing Software Included:	Halo Desktop Imager PC Magazine's Editors' Choice	FotoTouch by Logitech	Halo Desktop Imager PC Magazine's Editors' Choice	FotoTouch Color by Logitech
Text Scanning Software Included:	Perceive Personal	Catchword Pro by Logitech	Perceive Personal	Available at additional cost
Free Clip Art Library & ScanPod	✓	Available at additional cost	✓	Available at additional cost
Your Price	$179.00	$279.99*	$279.99	$524.99*

*Average of these prices quoted by Eggland Software stores in the San Francisco Bay Area on August 9, 1993.
Hand Scanner Bundles require 386 or higher, Windows 3.1, 4MB RAM, 8MB hard disk space free

Your scanner comes bundled with text scanning software, image editing software, plus a scanpad and clip art library!

Free with scanner!

Ready-To-Scan Images with Neat ScanPad!

ENVISIONS' Clip Art has over 13 categories of hundreds of useful images. The **ScanPad** holds pages in place while scanning. Use both to add eye-catching documents! *Value $39.95*

Free with scanner!

Scan Text for Quick Data Entry

Perceive Personal's accuracy and speed saves time and effort when scanning text. **Perceive** recognizes a variety of text styles and sizes. Up to 99.5% accurate: there's no need to ever re-type! *Retail Value $195*

Free with scanner!

Automatically Merge Multiple Scans and Create Posters

HALO Desktop Imager brings full desktop scanner power to your hand-held! Automerging assembles multiple scans with ease. Powerful printing capabilities! *Retail Value $139*

One Year Warranty!

"I am thrilled with my ENV256 and software. (It) allows me to perform a wonderful variety of things at a reasonable price."
—**Bob Temple, Hackettstown, NJ**

"ENV256 installed easily and worked wonderfully. Documentation was good. Thanks!"
—**Lionel O. Dotson, Sykesville, MD**

"The ENV256 is a great product for the price. I was scanning in 30 minutes. Thanks."
—**Don Slack, New Church, VA**

TWAIN Compatibility

(800) 926-SCAN (7226)

Local (415) 692-9061 • Fax (415) 692-9064 Envisions Solutions Technology, Inc., 822 Mahler Road, Burlingame, CA 94010

WORKS WITH WINDOWS

ENVISIONS
Scanner Solutions Made Easy

PCComputing FREE PRODUCT INFORMATION

Circle the numbers below corresponding to products featured in this issue's advertisements and listed in the Editorial Product index. Manufacturers will mail product literature to you free of charge.

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Please answer questions below:

1. **Where do you use your computer?** (Check one only)
   A. ☐ Home B. ☐ Business C. ☐ Both
2. **What kinds of computers do you use?** (Check all that apply)
   D. ☐ IBM/Compatible Laptop E. ☐ IBM/Compatible Desktop F ☐ MAC
3. **Do you plan to buy any of the hardware or software mentioned below in the next three months?** (Check all that apply).

HARDWARE
G. ☐ PC
H ☐ MAC
I. ☐ Laptop
J. ☐ Printer
K. ☐ Monitor
L. ☐ Disk/Tape Back-up
M. ☐ Add-in Board
N ☐ Modem
O ☐ Input Device
P ☐ Local Area Network

SOFTWARE
Q. ☐ Accounting
R. ☐ Spreadsheet
S. ☐ Personal Finance
T. ☐ Desktop Publishing
U. ☐ Word Processor
V ☐ Database Manager
W ☐ Graphics
X ☐ Utility

Y ☐ Communications
Z. ☐ Windows/Multi-tasking
1. ☐ Programming Language/Compiler
2. ☐ Integrated/Multifunction
3 ☐ CAD

4. **From which of the following sources do you purchase personal computer products?** (Check all that apply)
   4 ☐ Specialty Computer Retail Stores 6. ☐ Direct from Manufacturers
   5. ☐ Mail Order Firms 7 ☐ Other

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HARDWARE	SOFTWARE	
G. ☐ PC	O. ☐ Accounting	Y. ☐ Communications
H. ☐ MAC	R. ☐ Spreadsheet	Z. ☐ Windows/Multi-tasking
I. ☐ Laptop	S. ☐ Personal Finance	1. ☐ Programming Language/ Compiler
J. ☐ Printer	T. ☐ Desktop Publishing	
K. ☐ Monitor	U. ☐ Word Processor	2. ☐ Integrated/Multifunction
L. ☐ Disk/tape Back-up	V. ☐ Database Manager	3. ☐ CAD
M. ☐ Add-in Board	W. ☐ Graphics	
N. ☐ Modem	X. ☐ Utility	
O. ☐ Input Device		
P. ☐ Local Area Network		

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This Month's Hottest Software Downloads

Gates does Windows

TITLE	FILENAME	DESCRIPTION	LOCATION
Gates Does Windows	GDW.ZIP	This Windows 3.1 screensaver with sound features Microsoft CEO Bill Gates moonlighting as a window-washer.	After Hours Forum Library 4
Project Event Planner	APLANR.ZIP	Helpful Windows program for quick project planning, activity or resource scheduling. Shifts all events forward/backward in time.	PBS APPS Library 5
Starfire	STARFI.ZIP	Action-packed, arcade-quality "shoot 'em up." Battle an evil alien race that has set out to destroy earth.	PBS ARCADE Library 3
WinZip	WINZIP.ZIP	Windows Zip file manager for use with PKZip.	PBS APPS Library 4
HomePlan	HOMEPL.ZIP	Easy-to-use program to design a floor plan for your house.	PBS APPS Library 8
Secrets of Credit Repair	CREDIT.ZIP	Tips, tools and hints for repairing your credit bureau reports.	PBS APPS Library 6
NeoPaint	NPNT1.ZIP, NPNT2.ZIP	Great color graphics painting program for DOS.	PBS APPS Library 8

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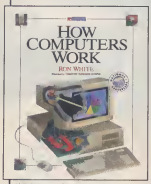

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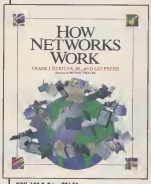

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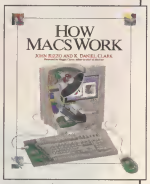

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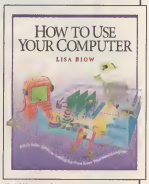

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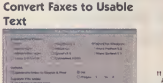

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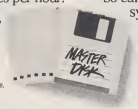

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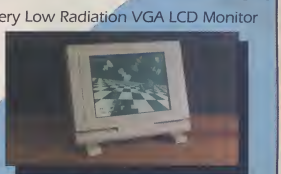

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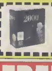

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Deskpro 286E, 386-20, 20E, 25, 25E	1MB	113131-001	$59
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Deskpro 386S	4MB Board	113634-001	$219
	4MB Module	112534-001	$259
Deskpro 386-2DE, 25E	4MB	113645-001	$299
Deskpro 386/33, 386/33l, 486/25; 33L,50L, Systempro	2MB	115144-001	$124
	8MB	116561-001	$449
	32MB	116568-001	$1999
Systempro, Deskpro	6 SKT EXP BRD W/2MB	116569-001	$399
Compaq "M"	2-64MB	129160-001	$448
Deskpro 286N, 386N, 386SX/20, 20N, Portable 486c Deskpro M , Systempro LT Series 129160-001, Compaq Pro Signia	1MB	118688-001	$49
	2MB	118689 001	$105
	4MB	118690 001	$238
	8MB	128877-001	$444
Prolina 3/25 & 25Z	2MB	141738-001	$109
	8MB	141742-001	$399
Prolina 4/25si, 4/33, 4/50	2MB Module	141683-001	$108
	4MB Module	141684 001	$238
	8MB Module	141685-001	$418
Compaq Pro Signia	16MB	149320-001	$995
	32MB	149147-001	$2395

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Contura 320, 325	2MB	139497-001	$108
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	8MB	139499-001	$418
Contura 4/25CX	4BM	146520-001	$228
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	16MB	146532-001	$948
SLT/286	1MEG MOD	110235-001	$79
	4MEG MOD	110237-001	$208
SLT386	1MEG MOD	118303-001	$79
	2MEG MOD	118304-001	$108
	4MEG MOD	118305 001	$238
Lte 286	1MEG BRD	117081-001	$79
	2MEG BRD	117081-002	$109
	4MEG BRD	117081-004	$238
Lte 386s/20	1MEG BRD	121125-001	$98
	4MEG BRD	121125-002	$218
Lte Lite/20, 25, 25C	2MEG BRD	129769-001	$138
	4MEG BRD	129769-002	$248
	8MEG BRD	129769-003	$421
	16MEG BRD	129769-004	$1395
LTE Lite/20 & Lite/25,25C	16MB Card	N/A	$1045
LTE Lite 486/25C	4MB Card	142337-002	$239
	8MB Card	142337-003	$478
	16MB Card	142337-004	$1198

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256X9	$10	$12	$15	$17		
1MEGX3		$65	$66	$71		
1MEG X 9	$54	$67	$70	$74	$79	$88
4MEG X 9		$178	$188	$198		
16MEG X 9 (36 CHIP)			$999			
256X36 1MEG (72 Pin)		$69				
512X36 2MEG (72 Pin)		$114	$124	$129		
1X36 4MEG (72 Pin)		$248	$258	$288		
2X36 8MEG (72 Pin)		$418	$447	$478		
4X36 16MEG (72 Pin)		$748	$799	$848		
8X36 32MEG (72 PIN)			$2150			

D-Ram Chips

DESCRIPTION	150NS	120NS	100NS	80NS	70NS	60NS
64 X 4	$1 95	$2 25	$2 45	$2 95		
256X1 STATIC				$1 95	$2 25	
256 X 1	$1.45	$1 85	$2 40	$3 00	$3 15	$3 20
256 X 4			$5 45	$6 95	$7 45	$7 95
1MEG X 1		$2.95	$3 50	$4 75	$5 45	$5 75
1MEGX1 STATIC				$4 95	$5 25	
1MEGX4				$22 00	$25 00	$29 00

CACHE MEMORY

	15ns	20ns	25ns
8KX8	5 95	5 45	4 95
32X8	9 95	8 75	
64x1	10 95	9 45	8 95
64x4	11 95	9 95	8 95
16x4	9 95	6 45	5 95
128x8		60 00	50 00

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Brother HL-10V/DV		$165		$264		
Canon LBP4, 4 Lite & 4+	$118	$184				
Compaq Pagemark 15 & 20				$289		$420
Epson Action Laser II, 8000	$95		$163		$229	
Epson + 6000 and many more		$98		$168		
Fujitsu 7100 & 7200	$199	$279				
HP Deskjet 500, 500C and 550C		$59 (256K)				
HP2, 2D,		$89		$146		
3, 3D, 3P, 2P, 2P+		$103		$159		
HP Laser Jet 4, 111Si, XL300				$258		$498
IBM Laser 4019, 4019E (3 5MB)		$129		$189		
IBM Laser 4029 ALL MODELS		$119		$189		
NEC 90, 290		$128				
NEC 95		$118				
OKI 400	$78	$98				
Packard Bell PB9500		$115		$188		
Panasonic 4410/4430		$119		$168		
Panasonic 4420/4450		$118		$188		
Panasonic 4450	$115					
Panasonic 4455		$129				
QMS 410	$119	$159		$249		
Star LS04	$129	$179		$269		
StarScript 4	$128	$178		$258		
Tosiba Page Laser 6		$99		$168		
TI XL/PS17/PS35	$48					

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AT&T Safari	2MB	37650	$148
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Bondwell B-310	1MB	23050-09100	$128
Dec pc 320 Notebook	2MB Mod	FB-PCIM BA	$149
	4MB Mod	FR-PCIM-88	$298
	8MB Mod	FR PCIM BD	$345
Dell Laptop 212, 320N, 320N+	2MB Mod	310-3204	$119
Dell 325N, NC	2MB Mod	310-3210	$119
Dell NL20 & NL25	2MB Mod	310-3213	$148
Epson NB 3 Notebook	4MB	A808511	$238
Epson NB SL/	2MB Mod	A808771	$138
25C Notebook	4MB Mod	A808781	$228
Everex Tempo LX, LX20	2MB	00160	$98
Everex Carrier	2MB	00263-00	$98
Grid 1500	4MB	52587	$238
Grid 1450SX	2MB	6200203	$148
Goldstar GS520, 386SX16	1MB	N/A	$98
	4MB	N/A	$248
NCR 3120 Notebook	4MB Mod	3120-K104	$299
NCR 3170 Notebook	4MB Mod	3123-K104	$399
Packard Bell, Magnavox, Mitsuba	1MB	N/A	$88
	4MB	N/A	$248
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Samsung Notemaster 386S	2MB	SNM002	$195
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Sharp 6640	2MB	N/A	$178
Sharp 4700MZ-200	1MB	CE-471	$198
Sharp 8501 Colorstar	2MB	N/A	$398
TI Travelmate 2000	1MB	2568034-0011	$88
TI Travelmate 3000SX, WINSX	2MB	2566996-0001	$118
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BRAVO 3/25'S	2MB	500710-004	$118
	8MB	500824-002	$418
ADVANTAGE 386SX/20,25 PRO SX/25 BRAVO 3/33'S	2MB	500962-001	$105
	8MB	500962-002	$434
ADVANTAGE PRO 486DX/33,SX/25, BRAVO LC 4/25S, 33, 33S, 50D, 4'66D	2MB	500987-001	$108
	4MB	500987-002	$238
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	1MB	500780-002	$59
ADVANTAGE 486/25,33,33P,SX20 BROVO 4/33,486/25,PREMIUM 4/25, 33TE, SE 4/33	2MB	500718 004	$119
	2MB	500780-005	$119
ADVANTAGE 486/25,33,33P SX20,POWER PREMIUM 3/33,4/33,33S,50D,66D, PREMIUM 386/33TE 486/25 E 25TE 33,33TE, PREMIUM II 386/25,33 486/33,486SX/20 PREMIUM SERVER SE 4/33	4MB	500780-004	$228
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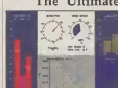

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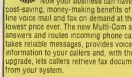

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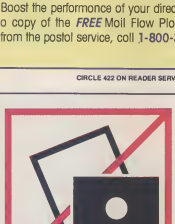

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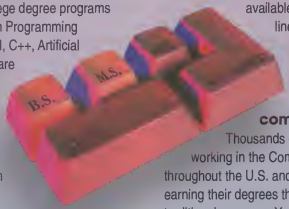

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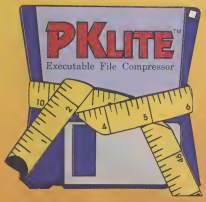

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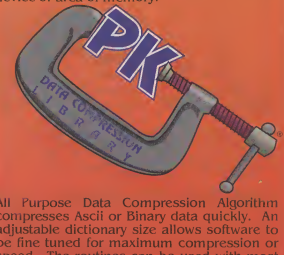

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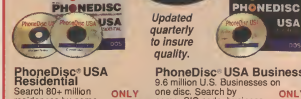

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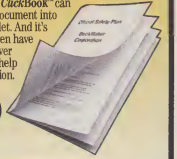

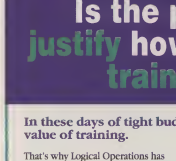

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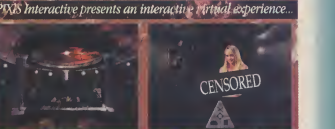

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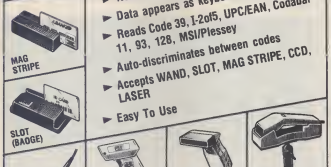

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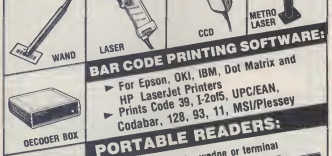

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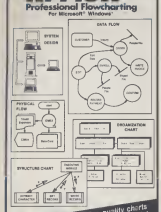

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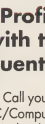

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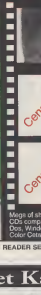

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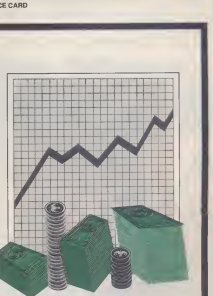

Subterranean Clipper Chip Blues

"Phone's tapped anyway." So do it for Dylan and for Jefferson (Airplane, Starship, and Thomas).

I'VE NEVER HAD a sip of alcohol, nor any recreational drugs (not one puff to uninhale), but, being 38 years old, I feel I was part of the hippie culture. I was young and rural in the sixties, but my formative years were spent listening to music created by people who chased the muse down many chemical alleys.

Top 40 radio blared that the government wasn't to be trusted. Dylan sang "Phone's tapped anyway," and his inflection said that was a bad thing. But even as I was sucking up the culture, my skeptical side said that all the "Tin soldiers and Nixon's coming . . ." stuff might be a little dramatic. Romanticizing living outside the law, coupled with the physiological effect of drugs, might be making these artists a little paranoid, a little nutty.

The joke was kinda on me. Paranoid or not, John Lennon *was* on Nixon and FBI hate lists, the Vietnam War probably *was* a very bad idea, and the Watergate break-in and subsequent cover-up really *did* happen. No government is to be trusted. I could have gotten a stronger lesson from the founding fathers, but they didn't have any records out. "You say you want a revolution?" . . . "The government that governs least governs best."

Clinton is younger than any Rolling Stone (unless they replace Bill Wyman with a new bass player from his ex-wife's generation). It would seem that Bill *Jefferson* Clinton would share the mistrust of Big Brother that we tapped our collective foot to. But remember, he's not Bob Dylan and Neil Young—he's Kenny G and Fleetwood Mac. Watch him.

Willy picked up Bush's evil encryption Clipper Chip fascist football and ran with it ("Meet the new boss—same as the old boss"). The Clipper Chip is supposed to give us more privacy, which we need. An ex-friend of mine taped Madonna talking to her business manager on her cordless phone, and some punk ("punk" in the prison sense) broke into my Internet account and read my mail.

The Clipper Chip, which was designed by government engineers, would be used to scramble and decode information so that only the addressee could read it. The government would sell this chip below market value (some people believe they'd be getting something for nothing; some people believe Elvis put syringes in Pepsi), and we'd all have cheap privacy. Oh, by the way ("The large print giveth, the small print taketh away"), the government would keep all the keys so they could eavesdrop on might-be-bad-guys (with a subpoena, of course).

What?!

The anti–Clipper Chip people sent me megs and megs of reasons why the Clipper Chip sucks (the information on how it works is kept secret, so private scientists wouldn't be able to check for mistakes; trade with other countries would be difficult; how safe could the codes be kept?; and so on). Big cheese computer people yapped against it, and it got shot down the first time around on the legislation front.

On the tech front, there is a great cypherpunk ("punk" in the rock and roll sense) alternative called Pretty Good Privacy, which is nongovernment and free. One of my math-hip friends explained public-key encryption to me, and it's pretty thinking; I'll try to explain it in a future column. There was even talk of making private encryption illegal (an evil idea, pure and simple).

The more research I did, the simpler it got. You have inalienable rights including life, liberty, and the pursuit of happiness. That's it. We have a right to communicate with anyone we choose without anyone listening in. The government works for us. Power to the people.

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ILLUSTRATION BY GARY BARTHOLOMEW

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